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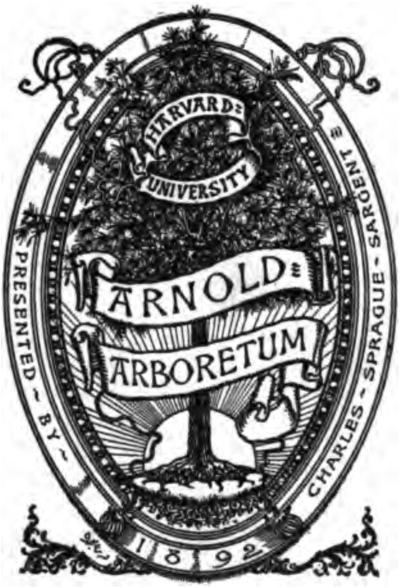
HARVARD UNIVERSITY
ARNOLD ARBORETUM
PRESENTED BY CHARLES SPRAGUE SARGENT
1892

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THE

NORTH AMERICAN

SYLVA.

THE
NORTH AMERICAN
SYLVA,

OR

A DESCRIPTION OF THE FOREST TREES,

OF THE

UNITED STATES, CANADA AND NOVA SCOTIA.

Considered particularly with respect to their use in the Arts
and their introduction into Commerce;

TO WHICH IS ADDED
A DESCRIPTION OF THE MOST USEFUL OF THE EUROPEAN FOREST TREES.

ILLUSTRATED BY 150 COLOURED ENGRAVINGS.

BY F. ANDREW MICHAUX,

Member of the American Philosophical Society of Philadelphia; of the Royal
Agricultural Society, Correspondent of the Institute of France, etc.

> .... *arbore sulcamus maria, terrasque admovemus,*
> *arbore exædificamus tecta.*
> PLINII SECUNDI: *Nat. Hist.*, lib. XII.

VOL. III.

PHILADELPHIA,
Sold by THOMAS DOBSON. — SOLOMON CONRAD.

PARIS, PRINTED BY C. D'HAUTEL.
1819.

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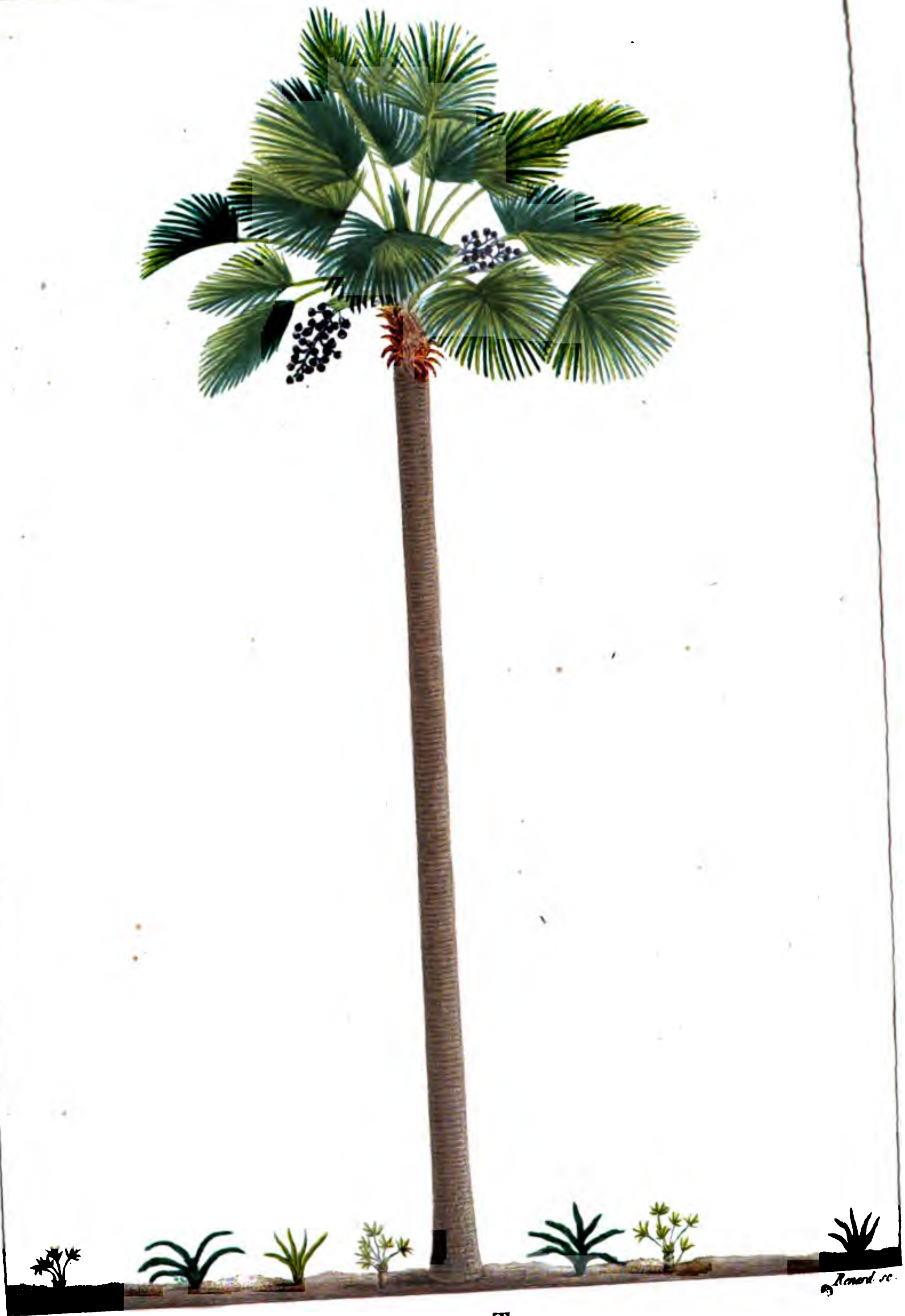


A. Riché del.t

Renard sc.

Cabbage Tree.

Chamærops palmetto.

THE
NORTH AMERICAN
SYLVA.

CABBAGE TREE.

Hexandria trigynia. Linn. **Palmæ. Juss.**

Chamærops palmeto. *C. caule arboreo; frondibus palmatis, plicatis, stipitibus non aculeatis.*

From its lofty height, this vegetable is considered in the United States as a tree; and upon the shores of the Ocean, where it grows, it is called Cabbage Tree. It belongs to the genus of the Palms, and is found farther north than any other species in America, being first seen about Cape Hatteras, in the 34th degree of latitude, which, in the temperature of the winter, corresponds with the 44th in Europe. From Cape Hatteras it spreads to the extremity of East Florida, and probably encircles the Gulf of Mexico: I have no doubt that it exists also in Cuba and the Bahama Isles; I have seen it in Bermuda, which is more than 600 miles from the coast of North America.

Farther south the Cabbage Tree is not confined, as in the United States, to the immediate vicinity of the sea;

on the river St. John, in Florida, a few miles above Lake George, I caused two stocks to be felled at the distance of 40 or 50 miles from the shore.

A trunk from 40 to 50 feet in height, of an uniform diameter, and crowned with a regular and tufted summit, gives the Cabbage Tree a beautiful and majestic appearance. Its leaves are of a brilliant green, palmated, and borne by petioles from 18 to 24 inches long, nearly triangular and united at the edges; they vary in length and breadth from 1 foot to 5 feet, and are so arranged that the smallest occupy the centre of the summit, and the largest the circumference. Before their developement they are folded like a fan, and as they open, the outside sticks break off and fall, leaving the base surrounded with filaments woven into a coarse and flimsy russet web.

The base of the undisclosed bundle of leaves is white, compact and tender; it is eaten with oil and vinegar, and resembles the artichoke and the cabbage in taste, whence is derived the name of Cabbage Tree. But to destroy a vegetable which has been a century in growing, to obtain three or four ounces of a substance neither richly nutritious nor peculiarly agreeable to the palate, would be pardonable only in a desert which was destined to remain uninhabited for ages. With similar prodigality of the works of Nature, the first settlers of Kentucky killed the Buffalo, an animal weighing 12 or 15 hundred pounds, for the pleasure of eating its tongue, and abandoned the carcase to the beasts of the wilderness.

The Cabbage Tree bears long clusters of small greenish flowers, which are succeeded by a black, *inesculent* fruit, about the size of a pea.

In the Southern States the wood of this tree, though extremely porous, is preferred to every other for wharves: its superiority consists in being secure from injury by sea-worms, which, during the summer, commit such ravages in structures accessible to their attacks; but when exposed to be alternately wet and dry in the flowing and ebbing of the tide, it decays as speedily as other wood. This use of the Cabbage Tree is rapidly diminishing its numbers, and probably the period is not distant when it will cease to exist within the boundaries of the United States.

In the war of Independance the Cabbage Tree was found eminently proper for constructing forts, as it closes without splitting on the passage of the ball.

The growth and developement of the Palms have occupied the attention of distinguished botanists, to whose memoirs the reader is referred for more accurate information. The tardy growth of this species will always discourage its propagation.

PLATE CI.

A Cabbage Tree with its fruit.

PRIDE OF INDIA.

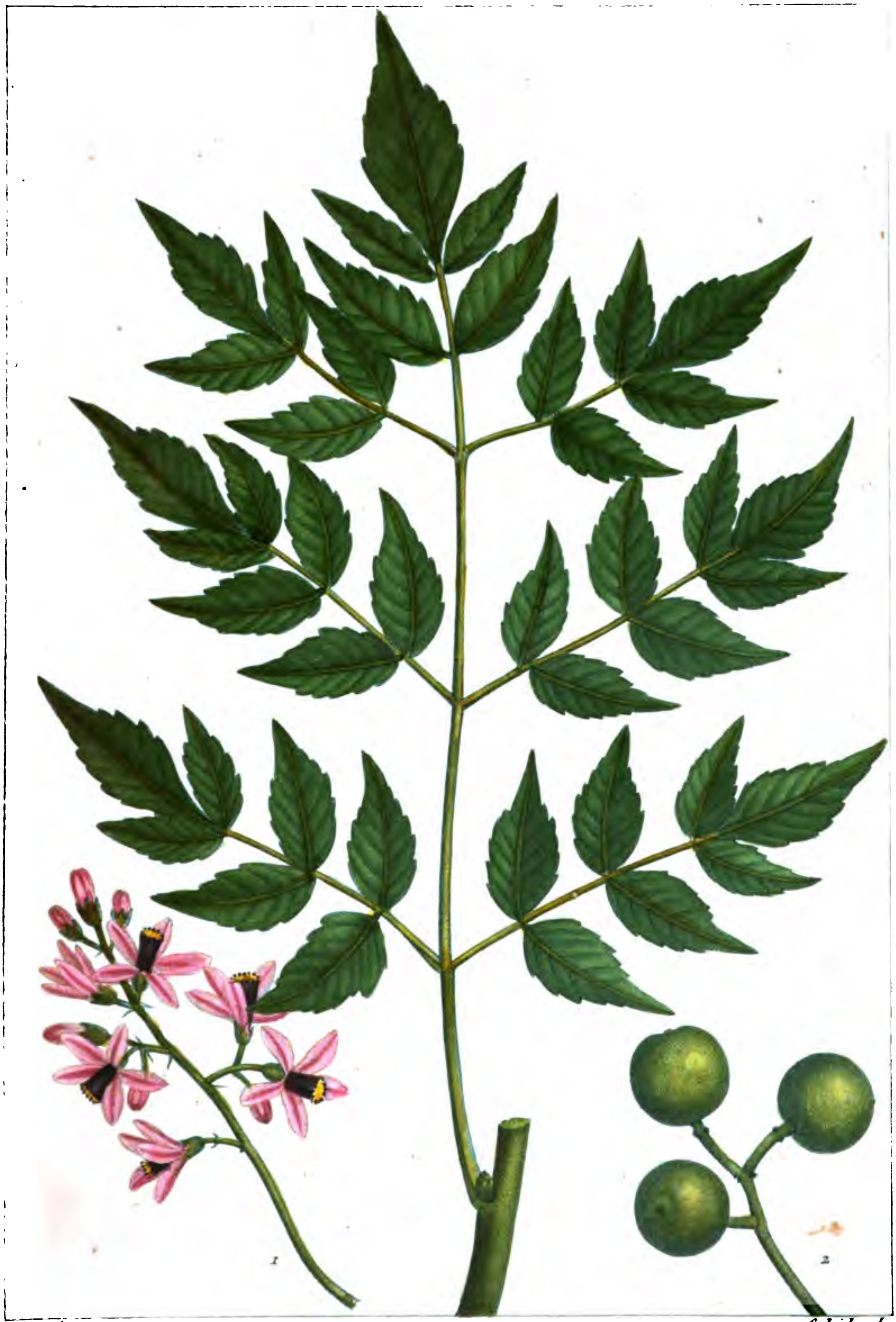
Decandria monogynia. Linn. Meliæ. Juss.

Melia azedarach. *M. foliis bipinnatis.*

This tree is a native of Persia. For the beauty of its flowers and the elegance of its foliage, it has long been in request in southern climates for embellishing towns and adorning the environs of dwellings. It is propagated for this purpose in India, in the Isles of France and Bourbon, in Syria, Spain, Portugal, Italy and the southern departments of France. In the New World it is found in several towns of the West Indies and of South America; and on the Northern Continent it is so abundant and so easily multiplied in the maritime parts of the Southern States, as to be ranked among their natural productions. This claim upon our attention is enforced by the valuable properties of its bark and of its wood.

The Pride of India rises to the height of 30 or 40 feet, with a diameter of 15 or 20 inches; but, when standing alone, it usually rests at a smaller elevation, and diffuses itself into a spacious summit. Its leaves are of a dark green colour, large, doubly pinnate, and composed of smooth, acuminate, denticulated leaflets. The lilac flowers, which form axillary clusters at the extremity of the branches, produce a fine effect, and exhale a de-

Pl. 102



Bessa pinx. Gabriel sculp.

Pride of India.

Melia axedarach.

licious odour. The ripe seeds are large, round and yellowish; they are sought with avidity by certain birds, particularly by the red-breasts, in their annual migration to the South, which, after gorging themselves immoderately, are sometimes found stupified by its narcotic power. The venomous principle which resides in this tree is taken notice of by Avicenna, an Arabian Physician, who flourished about the year 980. In Persia the itch is cured with an ointment made by pounding its leaves with lard.

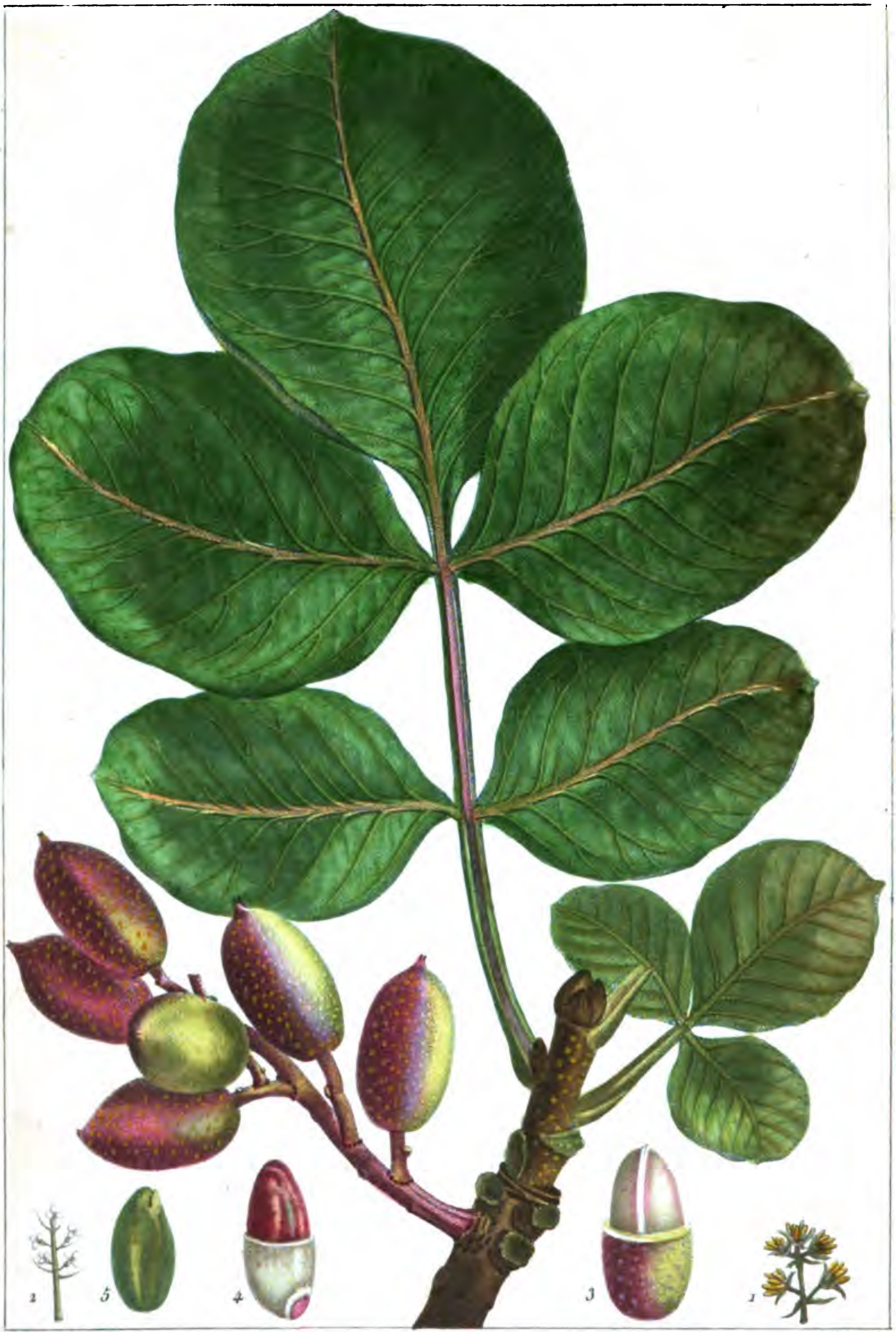
The Pride of India prospers in a dry and sandy soil, and magnificent stocks are seen in the streets of Charleston and Savannah. Its foliage, which, as well as the flowers, is developed early in the spring, affords a delightful refreshment to the eye, and yields a shelter from the fervour of the sun during the intemperate season. It grows with such rapidity, that from the seed it attains the height of 12 or 15 feet in four years. This surprising vegetation is chiefly remarked in stocks less than ten years of age, in which the concentrical circles are more distant than in any other tree. Like the Locust, it possesses the valuable property of converting its sap into perfect wood in the earliest stages of its growth; a stock 6 inches in diameter has only an inch of sap, and consequently may be employed almost entire. The wood is of a reddish colour, and is similarly organized with that of the Ash : it receives a less brilliant polish than the Red Bay, the Wild Cherry, the Maple and the Sweet

Gum; but this defect is unimportant in a country which possesses the species just mentioned and can easily procure Mahogany. The Pride of India is sufficiently durable and strong to be useful in building, and it will probably be found adapted to various mechanical uses; it has already been employed for pullies, which in Europe are made of Elm, and in America of Ash. I have been assured that it is excellent fuel.

This succinct description deserves attention in the southern parts of North America, and in those countries of Europe where the pride of India is considered as an ornamental rather than as an useful tree. Fields exhausted by cultivation and abandoned might be profitably covered with it.

PLATE CII.

A leaf of a third part of the natural size. Fig. 1, Flowers of the natural size. Fig. 2, Seeds of the natural size.



Bessa del *Gabriel sculp*

Pistacia Tree.

Pistacia vera.

PISTACIA TREE.

Diœcia pentendria. Linn.   Therebenthacæ. Juss.

Pistacia vera. P. *foliis impari-pinnatis; foliolis subovatis, recurvis, coruceis.*

The Pistacia Tree is indigenous to Asia Minor and is particularly abundant in Syria. It equals, and sometimes exceeds, 25 or 30 feet in height, and has heavy, crooked limbs clad in a thick, greyish bark, and large leaves composed of one or two pair of coriaceous leaflets, with a terminal odd one. This vegetable belongs to the class of diœcious plants whose sexes are borne by different stocks. The barren flowers are minute and hardly apparent, and the fertile ones are likewise small and of a greenish colour. Its fruit consists of thin-shelled oval-acuminate nuts, about the size of an olive, which are collected in bunches, and are commonly yielded in profusion. They are of a more agreeable flavour than the hazel-nut or almond, and are annually exported to those parts of Europe and Asia where the tree does not flourish.

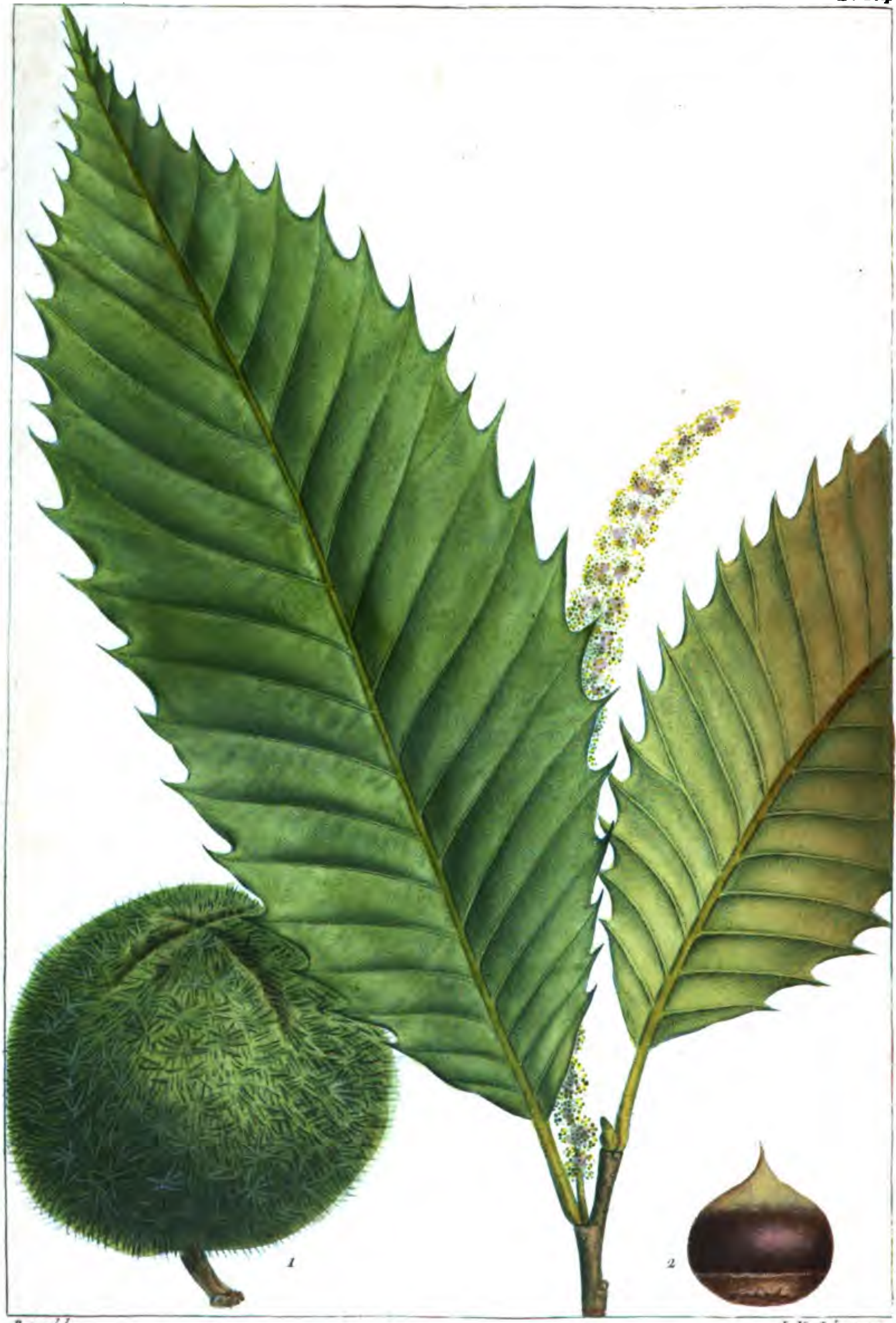
The Pistacia Tree succeeds in dry, calcarious, stony grounds, but shuns a sandy and a humid soil. In forming plantations care must be taken to possess trees of different sexes, without which the fructification is impossible; one male should be allotted to five or six females, and to avoid mistake, young grafted stocks should be procured, or suckers from the foot of an old tree.

The wood is hard, resinous, excellent for fuel, and proper for economical purposes.

According to Pliny, pistich-nuts were first brought to Rome about the reign of Tiberius, by Vitellius, Governor of Syria, and probably the tree was introduced into Italy at the same period. It has long been cultivated in Spain, Portugal and the South of France, and, when protected by a wall and favoured with a southern exposure, it yields fruit even at Paris. It is less delicate than the Orange Tree, and prospers in the same soil and climate with the Olive. Though it offers less powerful inducements than the Olive to attempt its introduction in West Tennessee and in the Southern States, it would afford an agreeable addition to the luxuries of the table.

PLATE CIII.

A branch with fruit of the natural size. Fig. 1, *A barren flower. Fig.* 2, *A fertile flower. Fig.* 3, *Fruit with the nut exposed. Fig.* 4, *A nut with the kernel exposed. Fig.* 5, *A kernel without the pellicle.*



Bessa del.

J. N. Joly sculp.

American Chesnut.

Castanea vesca.

AMERICAN CHESNUT.

Monœcia polyandria. Linn. Amentaceæ. Juss.

Castanea vesca. *C. foliis lanceolatis, acuminatò-serratis, utrinquè glabris; nucibus dimidio superiore villosis.*

The Chesnut does not venture beyond the 44th degree of latitude. It is found in New Hampshire between the 43d and the 44th degrees, but such is the severity of the winter that it is less common than in Connecticut, New Jersey and Pennsylvania. It is most multiplied in the mountainous districts of the Carolinas and of Georgia, and abounds on the Cumberland Mountains and in East Tennessee.

The coolness of the summer and the mildness of the winter in these regions are favourable to the Chesnut; the face of the country, also, is perfectly adapted to a tree which prefers the sides of mountains or their immediate vicinity, where the soil in general is gravelly, though deep enough to sustain its perfect developement. The Chesnut of the Old World attains its greatest expansion in similar situations: an example is said to exist on Mount Etna of a Chesnut 160 feet in circumference, or about 53 feet in diameter, and large enough to shelter 100 men on horseback beneath its branches; but its trunk is hollowed by time almost to the bark: near it stand several others more than 75 feet in circumference. At

Sancerre in the Department of the Cher, 120 miles from Paris, there is a Chesnut which, at 6 feet from the ground, is 30 feet in circumference; 600 years ago it was called the *Great Chesnut*, and though it is supposed to be more than 1000 years old, its trunk is still perfectly sound, and its branches are annually laden with fruit. I have never met with instances of such extraordinary growth in the United States, but the American species is probably susceptible of an equal developement, since, in the forests of North Carolina, it is commonly as tall and as large as the corresponding species in those of Europe; I have measured several stocks which, at 6 feet from the ground, were 15 or 16 feet in circumference, and which equalled the loftiest trees in stature.

The Chesnut is a stranger to the Province of Maine, the State of Vermont and a great part of Gennessee, to the maritime parts of Virginia, to the Carolinas, Georgia, the Floridas and Louisiana as far as the mouth of the Ohio.

Though the American Chesnut nearly resembles that of Europe in its general appearance, its foliage, its fruit, and the properties of its wood, it is treated by botanists as a distinct species. Its leaves are 6 or 7 inches long, an inch and a half broad, coarsely toothed, of an elongated oval form, of a fine brilliant colour and of a firm texture, with prominent parallel nerves beneath. The barren flowers are whitish, unpleasant to the smell, and grouped on axillary peduncles 4 or 5 inches long. The fertile aments are similarly disposed, but less conspicuous. The fruit is spherical, covered with fine prickles, and stored with two dark brown seeds or nuts, about as large as the end of the finger, convex on one side, flattened on the other, and coated round the extremity with whitish down. They are smaller and sweeter than the wild chesnuts of Europe, and are sold at 3 dollars a bushel in the markets of New York, Philadelphia and Baltimore.

The wood is strong, elastic, and capable of enduring the succession of dryness and moisture. Its durability renders it especially valuable for posts, which should be made of trees less than 10 inches in diameter and charred before they are planted in the earth. In Connecticut, Pennsylvania and a part of Virginia, it is also preferred for rails, and is said to last more than fifty years. For shingles this wood is superior to any species of Oak, though it has the same defect of warping. It is not extensively used for staves, and its pores, like those of the Red Oak, are so open that it is proper only for dry wares; the European species, which is more compact, is employed in Italy to contain wines and brandy.

Throughout France and the South of Europe, young Chesnuts are almost exclusively chosen for hoops, and they are proved to be better adapted to this important use than any other species, as they last longer in the humidity of the cellar. I have been informed by coopers at New York and Philadelphia that the American Chesnut is too brittle for hoops : if such is the fact, the European species has the advantage of superior flexibility. A more probable reason is that it is not strong enough to remain firmly attached, like the Hickory, by crossing the ends, but requires to be bound with osier, which is an additional labour and expense.

The Chesnut is little esteemed for fuel, and is not used in the cities of the United States : like the kindred species in Europe it is filled with air and snaps as it burns. The coal is excellent, and on some of the mountains of Pennsylvania where the Chesnut abounds, the woods in the neighbourhood of the forges have been transformed into copses, which are cut every sixteen years for the furnaces. This period is sufficient to renew them, as the summer is warmer in America than in Europe, the atmosphere more moist, and consequently vegetation more rapid. The proprietors of forges in Virginia, in the upper part of the Carolinas and on the Holston, should imitate the example by establishing copses of Chesnut and Oak. Besides the inducement of private gain, this measure would be attended with public benefit, by the economy of fuel, which is daily becoming scarcer and more costly. Among the Oaks, the Rock Chesnut Oak should be selected for this object, for reasons indicated in describing it.

Chesnut copses are considered in France as the most valuable species of property : every seven years they are cut for hoops, and the largest branches serve for vineprops; at the end of fourteen years they furnish hoops for large tubs, and at the age of twenty-five years they are proper for posts and for light timber. Lands of a middling quality, which would not have produced a rent of more than 4 dollars an acre, in this way yield a mean annual revenue of from 16 to 24 dollars.

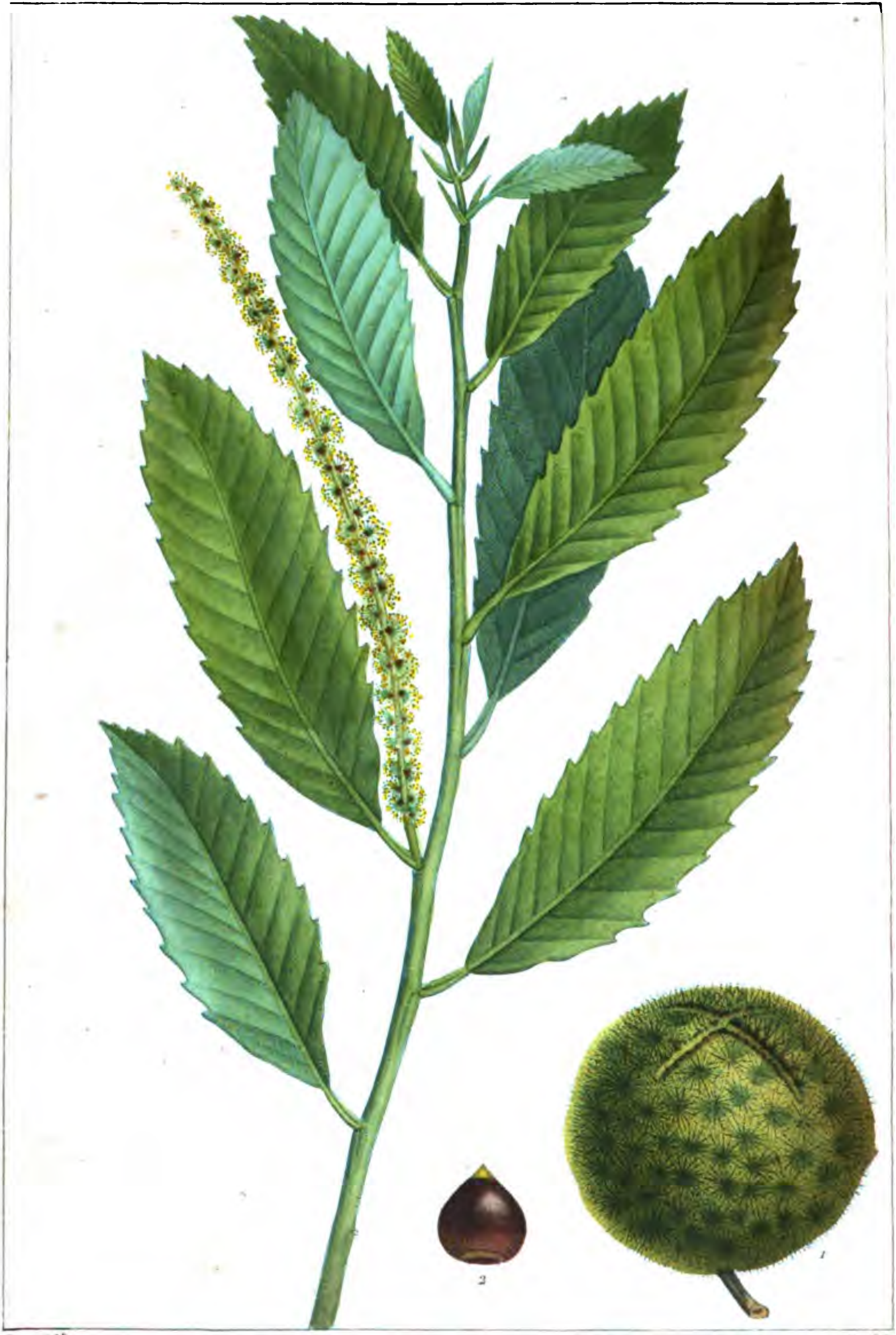
Different methods are pursued in forming the copses; in the New Dictionary of Natural History the following is preferred: After the ground has been carefully loosened with the plough and the harrow, lines are drawn six feet apart, in which holes about a foot in depth and in diameter are formed at the distance of five feet. A chesnut is placed in each corner of the holes, and covered with three inches of earth. As the soil has been thoroughly subdued, the nuts will spring and strike root with facility. Early in the second year three of the young plants are removed from each hole, and only the most thriving is left. The third or fourth year, when the branches begin to interfere with each other, every second tree is suppressed. To insure its success, the plantation should be begun in March or April, with nuts that have been kept in the cellar during the winter in sand or vegetable mould, and that have already begun to germinate.

The European Chesnut would be a valuable acquisition to many parts of the United States. This tree produces the nuts called *Marrons de Lyon*, which are four times as large as the wild chesnuts of America, and which are sent from the vicinity of Lyons to every part of France and to the north of Europe; they were formerly exported also to the West Indies. Kentucky, West Tennessee, and the upper part of Virginia and the Carolinas are particularly interested in the introduction of this species. It already exists in the nurseries of Philadelphia and New York, and it is only necessary to procure a few stocks to furnish grafts for young Wild Chesnuts transplanted from the woods or reared in the nursery.

The Chesnuts may be grafted by inoculation or the insertion of a shoot. The common method is by lopping a branch of the wild tree, removing a girdle of the bark near the end, from an inch to three inches wide, and replacing it by another from a limb of the cultivated stock of corresponding diameter. The lower edge of the new covering is exactly adjusted to the natural bark, but a portion of the limb is left exposed above, which is scraped down so as to form a species of tent or dressing, and the whole is protected from the weather by a coating of clay.

PLATE CIV.

Leaves and aments of the natural size. Fig. 1, *Full-grown fruit. Fig.* 2, *A chesnut.*



Bessa del.t Gabriel Sc.

Chincapin.

Castanea pumila.

CHINCAPIN.

Castanea pumila. *C. foliis ovalibus serratis, subtus incano-tomentosis; fructu parvo, in singulis capsulis echinatis unico.*

The Chincapin is bounded northward by the eastern shore of the river Delaware, on which it is found to the distance of a hundred miles from Cape May. It is more common in Maryland, and still more so in the lower part of Virginia, of the Carolinas, Georgia, the Floridas and Louisiana, as far as the river of the Arkansas. In West Tennessee it is multiplied around the *prairies* enclosed in the forests, and it abounds throughout the Southern States wherever the Chesnut is wanting.

In New Jersey, Delaware and Maryland, the Chincapin is a large shrub rarely exceeding the height of 7 or 8 feet; but, in South Carolina, Georgia and Lower Louisiana, it is sometimes 30 or 40 feet high and 12 or 15 inches in diameter.

The leaves are 3 or 4 inches long, sharply toothed, and similar in form to those of the American Chesnut, from which they are distinguished by their inferior size, and by the whitish complexion of their lower surface. The fructification, also, resembles that of the Chesnut in form and arrangement, but the flowers and fruit are only half as large, and the nut is convex on both sides and about the size of the wild hazel-nut. The nuts of the Chincapin are brought into the markets, and are eaten raw by children. The improvement of the Chesnut or of the Chincapin seems hardly to deserve attention, since the cultivated variety of Europe can easily be procured.

In the South of the United States the Chincapin fructifies on the most arid lands, but it is stinted to 6 or 7 feet in height: its perfect developement requires a cool and fertile soil. As it springs everywhere with facility, except in places liable to be covered with water, it is among the most common shrubs.

The wood of this species is finer-grained, more compact, heavier, and perhaps more durable than that of the Chesnut. It is perfectly fitted for posts, and lasts in the earth more than forty years. Stocks of sufficient size are so rarely found, that it is only accidentally employed for this purpose, and if the method of forming enclosures practised in the centre of the United States should prevail in the South, the Pride of India would merit a decided preference over the Chincapin. The saplings of this species are laden with branches while they are no thicker than the finger and are thus rendered too knotty for hoops. In the Southern States, where the White Oak and the Hickories are comparatively rare, perhaps the Chincapin might be advantageously reared for this purpose in copses. But it is a tree of secondary importance which can be recommended only to amateurs desirous of enriching their collections with a species of Chesnut interesting for the beauty of its foliage and the diminutive size of its fruit.

PLATE CV.

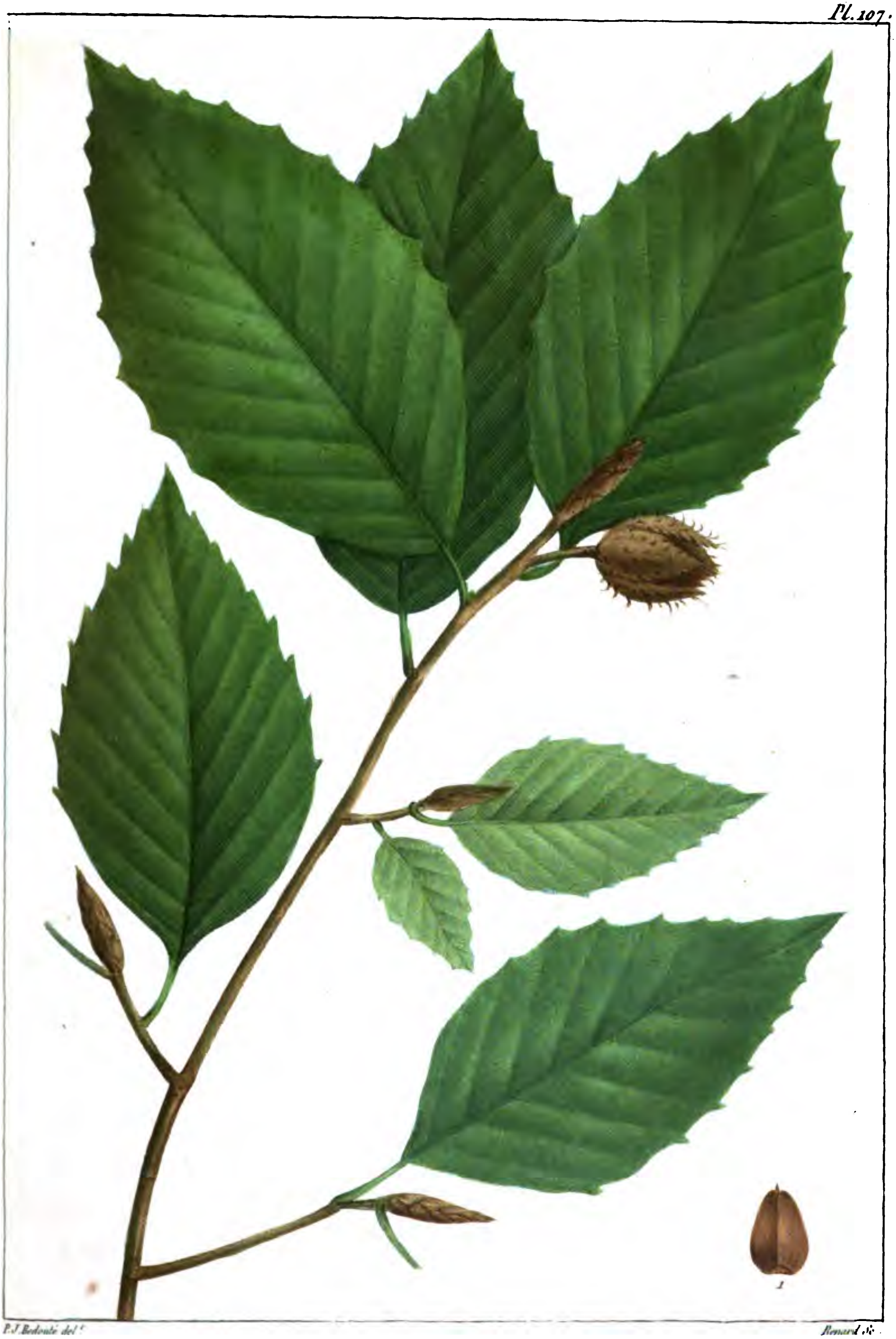
A branch with leaves and a barren ament of the natural size. Fig. 1, Full-grown fruit. Fig. 2, A nut.

WHITE BEECH.

Fagus sylvestris. *F. foliis acuminatis, obsolete dentatis, margine ciliatis.*

In North America and in Europe the Beech is one of the tallest and most majestic trees of the forest. Two species are found in Canada and in the United States, which have hitherto heen treated by botanists as varieties; but my own observations confirm the opinion of the inhabitants of the Northern States, who have long since considered them as distinct species and given them the names of White Beech and Red Beech, from the colour of their wood. In the Middle, Western and Southern States, the Red Beech does not exist or is very rare, and the other species is known only by the generic name of Beech. I have retained for the White Beech the latin specific name of *Fagus sylvestris* which corresponds with the short description in the *Flora Boreali-Americana,* and have given to the Red Beech that of *Fagus ferruginea,* which accords with the descriptive phrase in the edition of 1805 of Willdenow's *Species Plantarum.*

A deep, moist soil and a cool atmosphere are necessary to the utmost expansion of the White Beech, and it is accordingly most multiplied in the Middle and Western States. Though it is common in New Jersey,



P. J. Redouté del.t Renard sc.

White Beech.

Fagus sylvestris.

Pennsylvania, Maryland, and throughout the country east of the mountains, it is insulated in the forests, instead of composing large masses, as in Gennessee, Kentucky and Tennessee. I have found the finest Beeches on the banks of the Ohio between Gallipolis and Marietta, and have measured several stocks growing near each other, which were 8, 9 and 11 feet in circumference, and more than 100 feet high. In these forests, where the Beeches vegetate in a deep and fertile soil, their roots sometimes extend to a great distance even with the surface, and being entangled so as to cover the ground, they embarrass the steps of the traveller and render the land peculiarly difficult to clear.

The White Beech is more slender and less branchy than the Red Beech; but its foliage is superb, and its general appearance magnificent. The leaves are oval-acuminate, smooth, shining, and bordered in the spring with a soft hairy down. The sexes are borne by different branches of the same tree. The barren flowers are collected in pendulous, globular heads and the others are small and of a greenish hue. The fruit is an erect capsule covered with loose, flexible spines, which divides itself at maturity into four parts, and gives liberty to two triangular seeds. The bark upon the trunk of the Beeches is thick, grey, and, on the oldest stocks, smooth and entire. The perfect wood of this species bears a small proportion to the sap, and frequently occupies only 3 inches in a trunk 18 inches in diameter.

The specific name of White Beech is derived from the colour of its alburnum; and it should be observed that trees of the same genus are more frequently distinguished in the United States by the complexion of their wood than by the differences of their foliage and of their flowers. The properties of this wood will be more particularly mentioned in the description of the Red Beech.

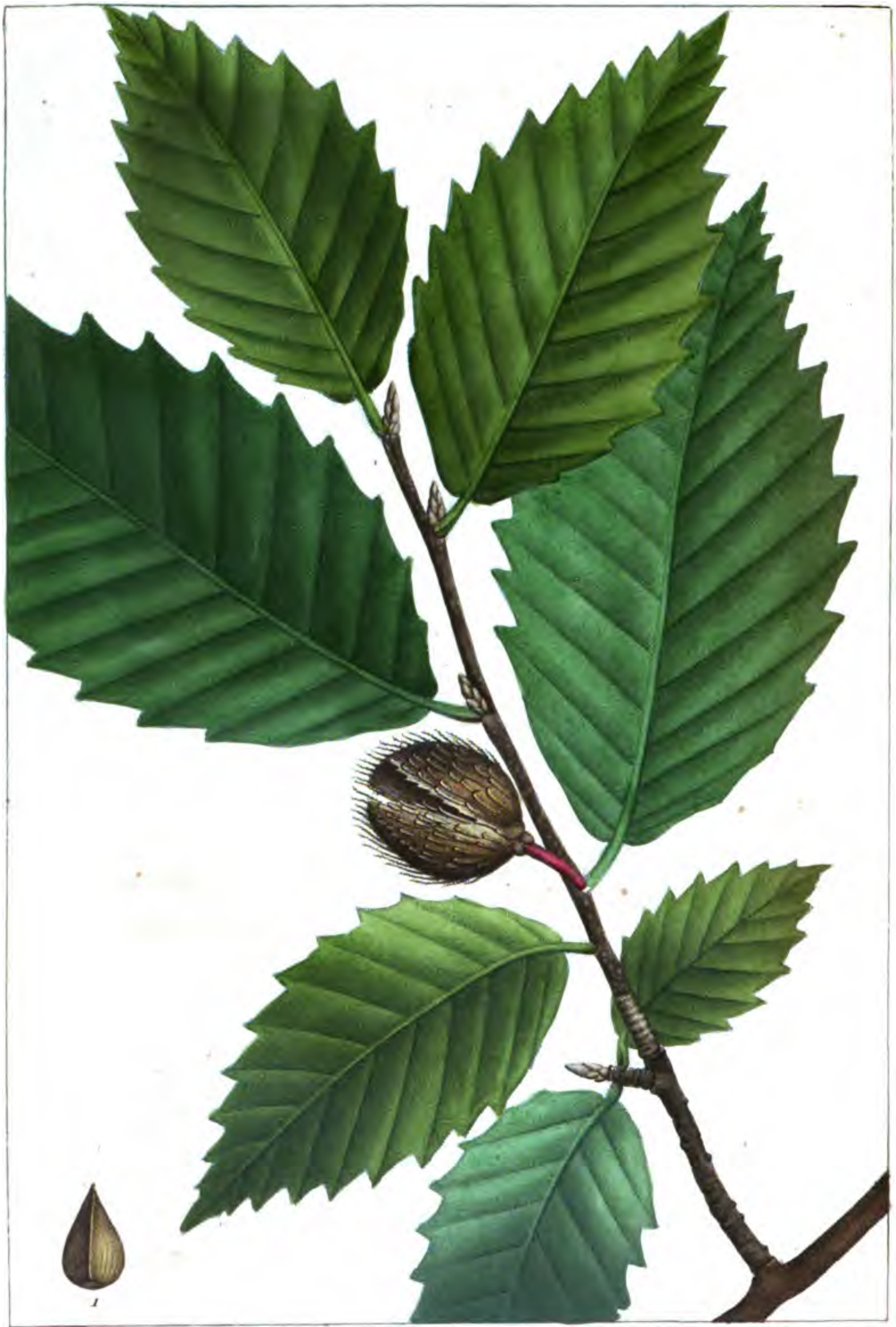
On the banks of the Ohio and in some parts of Kentucky, where the Oak is too rare to afford bark enough for tanning, the deficiency is supplied by that of the White Beech; the leather made with it is white and serviceable, though avowedly inferior to what is prepared with the bark of the Oak.

The Beech wood brought for fuel to the market of Philadelphia bears a small proportion to the Oak and the Hickory; hence we presume that it is comparatively little esteemed.

Notwithstanding the beauty of this tree, the properties of its wood are not such as to entitle it to attention in Europe.

PLATE CVI.

A branch with leaves and fruit of the natural size. Fig. 1, A beech-nut.



Bessa del.t

Gabriel Sc.

Red Beech.

Fagus ferrugina.

RED BEECH.

Fagus ferruginea. *F. foliis ovatò-acuminatis, grossè dentatis; nucibus duabus triquetris; calyce echinato, coriaceo, quadrifido, inclusæ.*

This species of Beech is almost exclusively confined to the north-eastern parts of the United States, and to the provinces of Canada, New Brunswick and Nova Scotia. In the District of Maine and in the States of New Hampshire and Vermont it is so abundant as often to constitute extensive forests, the finest of which grow on fertile, level or gently sloping lands, which are proper for the culture of corn. Its name is derived from the colour of its wood and not of its leaves, as might be supposed in Europe, where a species of unknown origin, with dull red and sometimes with purple foliage, is cultivated in the gardens.

The Red Beech bears a greater resemblance to that of Europe than to the kindred American species: it equals the White Beech in diameter, but not in height; and as it ramifies nearer the earth, and is more numerously divided, it has a more massive summit and the appearance of more tufted foliage. Its leaves are equally brilliant, a little larger and thicker, and have longer teeth. Its fruit is of the same form, but is only half as large, and is garnished with firmer and less numerous points. To these differences must be added a more important one in the wood : a Red Beech 15 or 18 inches in diameter consists of 3 or 4 inches of sap and 13 or 14 inches of heart, the inverse of which proportion is found in the White Beech.

The wood of the Red Beech is stronger, tougher and more compact. In the District of Maine and in British America, where the Oaks are rare, it is employed with the Sugar Maple and Yellow Birch for the lower part of the frame of vessels. As it is extremely liable to injury from worms, and speedily decays when exposed to alternate dryness and moisture, it is rarely used in the construction of houses. In the District of Maine the Hickories are rare and the White Oak does not exist, and when the Yellow Birch and Black Ash cannot be procured in sufficient abundance, the Red Beech is selected for hoops.

This wood is brought to Boston for fuel, but it is less esteemed and is sold at a lower price than the Sugar Maple. It serves for shoe-lasts, the handles of tools, and is especially proper for the tops of cards, because, when perfectly seasoned, it is not liable to warp. It is brought from the river Hudson to Philadelphia for the same uses : I have been informed by mechanics in that city, employed in making plane-handles of the Red Beech, that it is sometimes equal, though usually inferior, in compactness and solidity to the European Beech.

Red Beech planks about three inches thick are exported to Great Britain, for purposes which I am unable to particularize: but whatever may be the consumption, the American forests are extensive enough to supply for a long time the demands of commerce.

The European Beech bears so strict an analogy to the Red Beech, that it may be useful to take notice of its properties, its uses, and the means by which its duration is insured in important structures.

Experience has demonstrated the advantage of felling the Beech in the summer, while the sap is in full circulation: cut at this season, it is very durable, but felled in the winter, it decays in a few years. The logs are left several months in the shade before they are hewn, care being taken that they do not repose immediately upon the ground; after which they are fashioned according to the use to which they are destined, and laid in water for three or four months. They are said to be rendered in this way inaccessible to worms.

The Beech is very durable when preserved from humidity and incorruptible when constantly in the water; but it rapidly decays when exposed to alternations of dryness and moisture.

In Europe, where there are not as many trees as in North America with durable and elegant wood, such as the Birches and the Maples, we are dependant upon the Beech for a greater variety of uses. It is employed for tables and bedsteads, for screws, rollers, pestles, dishes, wooden shoes, corn-shovels, etc.; in the north of France it is taken for the felloes of wheels, and it was formerly used, instead of pasteboard, in bookbinding. In the valley of *Saint-Jean-pied-de-port* in the Pyrenees, oars are made of it to supply the neighbouring ports of the ocean. While the wood retains a portion of its sap, they are pliant and elastic; but for this use no tree can stand in competition with the Black Ash of the United States. Though the Beech is rapidly consumed; it is highly esteemed as a combustible, and its ashes are rich in alkali.

In certain cantons of Belgium, particularly near the village of St. Nicholas, between Ghent and Antwerp, very solid and elegant hedges are made with young Beeches placed 7 or 8 inches apart and bent in opposite directions so as to cross each other and form a trellis, with apertures 5 or 6 inches in diameter. During the first year they should be bound with osier at the points of intersection, where they finally become grafted and grow together. As the Beech does not suffer in pruning, and sprouts less luxuriantly than most other trees, it is perfectly adapted to this object. In the compendium at the close of my work will be found a more particular description of these hedges, which are highly interesting to the farmers of the Northern and Middle States. In the country of *Caux* and in other parts of Normandy, the farms and noblemen's seats are surrounded with Beeches, and curtains of foliage are here and there seen diversifying the landscape which always enclose a human habitation. Planted in a straight line, and breathing an unconfined air, they grow with greater rapidity, and form a lofty and superb trunk.

This tree is reared without difficulty from the seed. The nuts may be sown at any time between October and February, but the most eligible season is within a fortnight after they fall from the tree. The only necessary precaution is to subdue the ground with the plough and the harrow. As the young plants are liable to suffer by removal, they may be reared on the spot where they are to abide. To obtain straight and well-shaped trees, the nuts should be thickly sown, a part of the young plants plucked up, and the remainder fashioned with the pruning knife.

A very small space suffices to form a nursery for transplantation; as the young stocks increase and require room, the most vigorous of them are removed. In three years they are proper for hedges. The young Beech delights in shady situations and requires a soil unincumbered with herbage.

In France and Germany an oil is extracted from the beech-nut which is next in fineness to that of the olive. The forests of Eu and of Crécy in the Department of the Oise have yielded in a single season more than a million sacks[1] of this fruit, and in 1779 the forest of Compiegne near Verberie, Department of the Somme, afforded oil enough to supply the wants of the district for more than half a century.

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[1] A sack contains about two bushels.

The beech-nuts are of a triangular form, with a smooth, tough skin, and a fine interior pellicle adhering to the kernel. They are united in pairs in capsules garnished with soft points, from which they escape about the 1st of October, the season of their maturity.

The fruit should be gathered as soon as it is ripe, as it is liable to be injured by the rain. It is swept together upon the ground, and is afterwards cleansed with fans or in mills; but the harvest is increased by shaking the trees and receiving the nuts upon sheets extended beneath.

Being thus collected in dry weather and thoroughly cleansed, they are spread, like corn, in a garret or other place secure from humidity, and are frequently turned. They are found to be better and more productive when dried insensibly in this manner than when exposed to the sun.

The oil is abundant only when the fruit is perfectly ripe. The season for extracting it is from the beginning of December to the end of March; if the operation is longer delayed, the nuts are liable to be injured by the warmth of the season.

The skin is commonly ground with the kernel, but as the product in this way diminishes a seventh, it would be more advantageous to separate them, which might be done in a flower-mill properly adjusted. The kernel should be immediately reduced to a paste by a vertical stone or by a pestle-mill. As the paste becomes dry in the process, water is added in the proportion of one pound to fifteen pounds of fruit, to prevent its being impaired by the heat.

The paste is sufficiently reduced when the oil is discharged by the pressure of the hand. It is submitted to the press in sacks of coarse linen, of wool or of hair, and the force is gradually applied and long continued, so that the oil may be completely distilled: three hours at least are required in an ordinary press. To prepare the paste for a second pressure, it is pulverized, a proportion of water being added smaller than at first, and the whole is warmed by the careful application of a moderate heat. A *wedge-press* is commonly employed in the second operation.

With skill in the process the oil is equal to one sixth of the fruit. Its quality depends upon the care with which it is made, and upon the purity of the vessels in which it is preserved. It should be twice drawn off during the first three months without disturbing the dregs, and a third time at the end of six months: it arrives at perfection only when it becomes limpid, several months after its extraction. It improves by age, lasts unimpaired for ten years, and may be preserved longer than any other oil.

PLATE CVII.

A branch with leaves and fruit of the natural size. Fig. 1, A nut.

AMERICAN HORNBEAM.

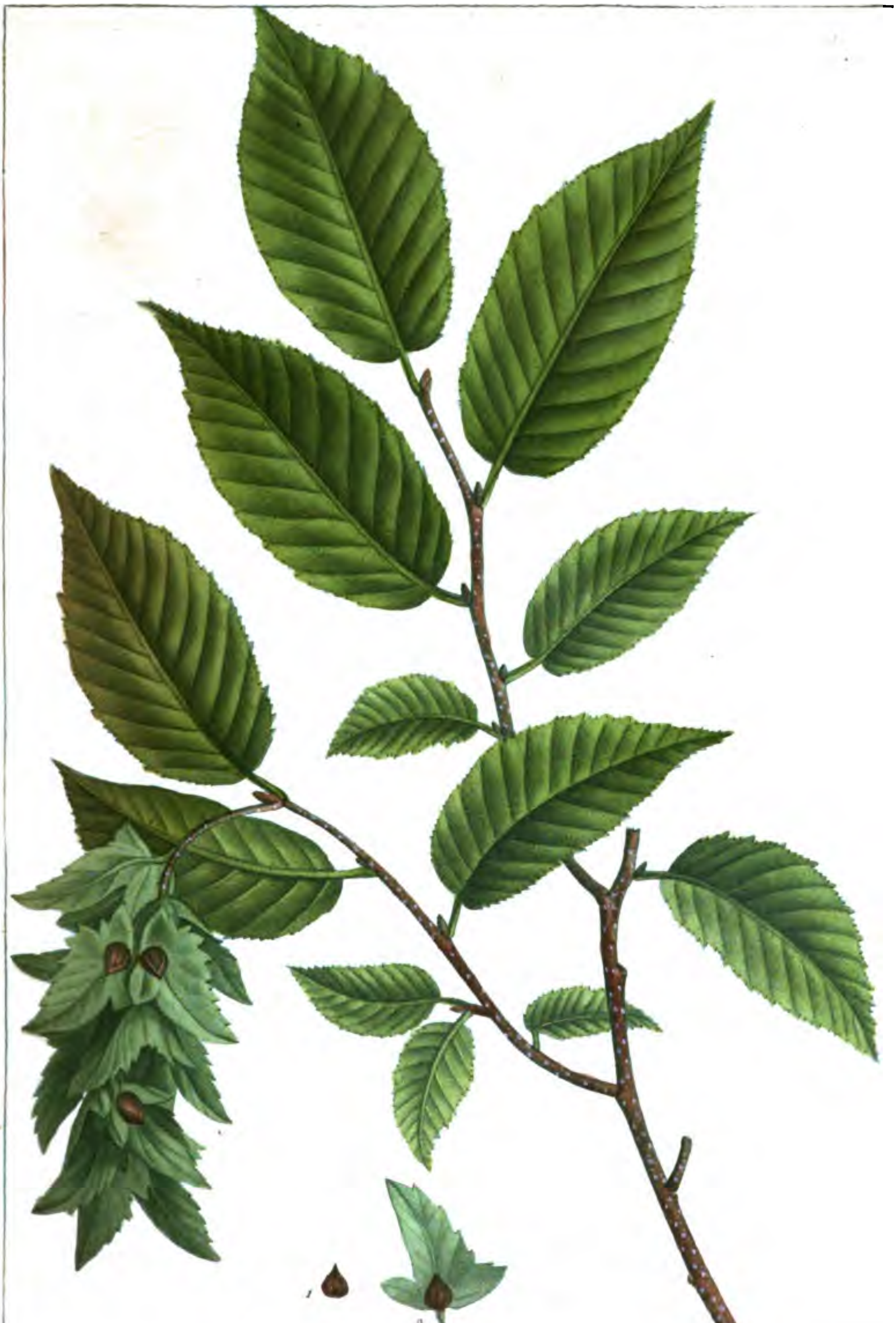
Carpinus americana. *C. foliis oblongo-ovalibus, serratis, involucrum laciniis acute dentatis.*

The American Hornbeam is found as far north as the provinces of Nova Scotia, New Brunswick and Lower Canada; but it is repressed by the severity of the climate and is less multiplied than in New Jersey, Pennsylvania and the Southern States. By the Americans it is called Hornbeam, and by the French of Upper Louisiana *Charme.*

The Hornbeam prospers in almost every soil and exposure, except in places that are too long inundated, or that are absolutely sterile like the *pine-barrens* of the Southern States and of the Floridas. Its ordinary stature is from 12 to 15 feet, and it is sometimes 25 or 30 feet high and 6 inches in diameter; but as not more than one stock in a hundred attains these dimensions it must be considered rather as a large shrub than as a tree; I have admitted it among the trees because it is met with at every step in the forests.

The leaves of the Hornbeam are oval-acuminate and finely denticulated. The sexes are united on the same stock, and the fertile flowers are collected in long, loose, pendulous, leafy aments at the extremity of the branches. The scales or leaves which surround them are furnished at the base with a hard, oval seed. The fruc-

Pl.10



Bessa del. Gabriel sculp

Hornbeam.

Carpinus virginiana.

tification is always abundant, and the aments remain attached to the tree long after the foliage is shed.

The trunk of the American Hornbeam, like that of the analagous species in Europe, is obliquely and irregularly fluted, frequently through all its length. By its form and the appearance of the bark, which is smooth and spotted with white, it is easily distinguished when the leaves are fallen.

The wood, like that of the European Hornbeam, is white and exceedingly compact and fine-grained. The dimensions of the tree are so small as to render it useless even for fuel, but it is employed for hoops in the District of Maine when better species cannot be procured.[1]

From these particulars it will readily be concluded that we have no interest in propagating the American Hornbeam in Europe, as our own species possesses equal strength and solidity, attains the height of 35 or 40 feet, with a diameter of 15 or 18 inches, and is consequently applicable in the mechanical arts and useful for fuel. The only superiority of the American species is for trellises; as it is naturally dwarfish its growth is more easily repressed, and as its branches are numerous it has a closer and more tufted foliage. The Hornbeam of Europe, on the other hand, would be a valuable acquisition to the forests of America.

PLATE CVIII.

A branch with leaves and fruit of the natural size. Fig. 1, A seed.

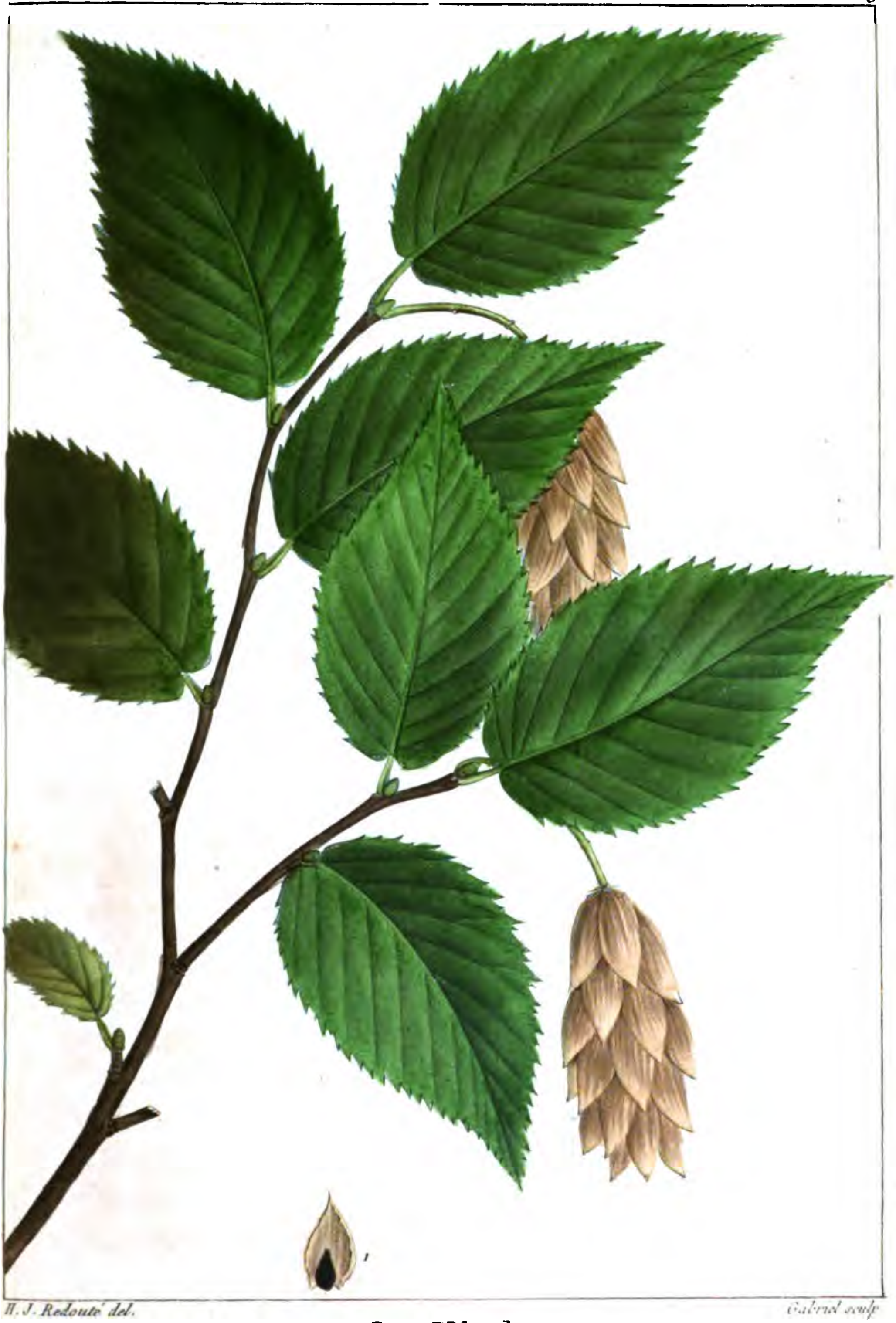
IRON WOOD.

Carpinus ostrya. *C. foliis cordato-ovalibus; amentis fœmineis oblongioribus; involucris fructiferis, compresso-vesicariis.*

East of the Mississippi the Iron Wood is diffused throughout the United States and the provinces of New Brunswick, Nova Scotia and Lower Canada. In New York, New Jersey, Pennsylvania and the Southern States, where it is most abundant, it bears the name which I have adopted; in Vermont, New Hampshire and the District of Maine, it is called Lever Wood, and by the French of Illinois, *Bois dur,* hard wood.

Though the Iron Wood is multiplied in the forests, it nowhere constitutes masses even of inconsiderable extent, but is loosely disseminated, and found only in cool, fertile, shaded situations. I have nowhere seen it more common nor more vigorous than in Gennessee, near lake Erie and lake Ontario; but it is always a tree of the second or even of the third order, rarely equaling 35 or 40 feet in height and 12 or 15 inches in diameter, and commonly not exceeding half these dimensions.

The leaves are alternate, oval-acuminate, and finely and unequally denticulated. The fertile and barren flowers are borne at the extremity of different branches



H. J. Redouté del. Gabriel sculp.

Iron Wood.

Carpinus ostrya.

of the same tree, and the fruit is in clusters like hops. The small, hard, triangular seed is contained in a species of reddish, oval, inflated bladder, covered at the age of maturity with a fine down, which causes a violent irritation of the skin if carelessly handled.

In the winter this tree is recognized by a smooth, greyish bark, finely divided, and detached in strips not more than a line in breadth.

The wood is perfectly white, compact, fine-grained and heavy. The concentrical circles are closely compressed, and their number in a trunk of only 4 or 5 inches in diameter evinces the length of time necessary to acquire this inconsiderable size. To its inferior dimensions must be ascribed the limited use of a tree, the superior properties of whose wood are attested by its name.

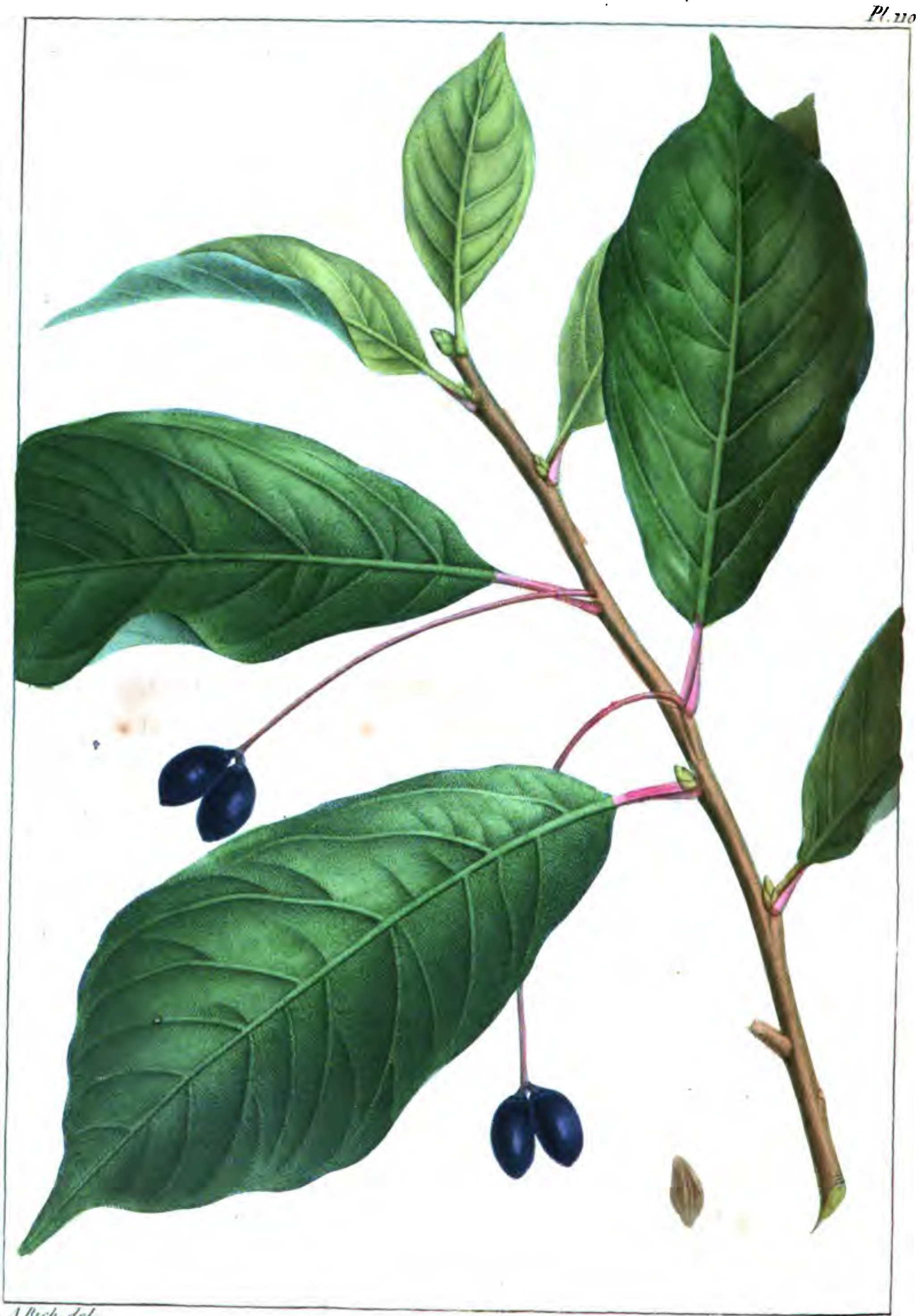
In the Northern States, and particularly in the District of Maine, the Iron Wood is used for the levers with which the trees felled in clearing the ground are transported to the piles on which they are consumed. Near New York, brooms and scrubbing-brushes are made of it, by shredding the end of a stick of suitable dimensions. Though its uses are unimportant, they might probably be more diversified; it seems well-adapted for mill-cogs, mallets, etc.

The Iron Wood flourishes in France: several stocks, 15 or 20 feet in height fructify annually on the ancient estate of *Duhamel du Monceau*, and young plants, the produce of self-sown seeds, are found in the vicinity.

This species is among the exotic trees which might be propagated with advantage in Europe.

PLATE CIX.

A branch with leaves and fruit of the natural size. Fig. 1, *A seed.*



A. Rich. del. Gabriel Sc.

Black Gum.

Nyssa sylvatica.

BLACK GUM.

Polygamia diœcia. Linn. Elæagnoides. Juss.

Nyssa sylvatica. *N. foliis ovalibus, integerrimis, petiolo, nervo medio, margineque villosis; pedunculis femineis longis plerumque 2-floris, nuce brevi, obovatâ, obtusè striatâ.*

In the park of Mr. W. Hamilton, at the Woodlands, near Philadelphia, I first observed the Black Gum. The river Schuylkill in this vicinity may be assumed as its northern boundary, though it is common in the woods on the road from Philadelphia to Baltimore. In all the more Southern States, both east and west of the Alleghany Mountains, it is more or less multiplied as the soil is more or less favourable to its growth. It is designated by the names of Black Gum, Yellow Gum and Sour Gum, neither of which is founded upon any of its characteristic properties; but as they have become sanctioned by use, however ill-chosen, I have adopted the first, which is the most common.

The vegetation of this tree exhibits a remarkable singularity: in Maryland, Virginia and the Western States, where it grows on high and level grounds with the Oaks and the Walnuts, it is distinguished by no peculiarity of form; in the lower part of the Carolinas and of Georgia, where it is found only in wet places with the Small Magnolia or White Bay, the Red Bay, the Loblolly Bay and the Water Oak, it has a pyramidical base resembling a sugar-loaf. A trunk 18 or 20 feet high and 7 or 8 inches in diameter at the surface, is only 2 or 3 inches thick a foot from the ground; these proportions, however, vary in different individuals.

The Black Gum is much superior in size to the Tupelo, being frequently 60 or 70 feet high and 18 or 20 inches in diameter. I have observed that on elevated and fertile lands in the upper part of Virginia, in Kentucky and Tennessee it is larger than in marshy grounds in the maritime parts of the Southern States.

The leaves of this species are 5 or 6 inches long, alternate, entire, of an elongated oval form, and borne by short and downy petioles. The flowers are small, not conspicuous, and collected in bunches. The fruit is of a deep blue colour and of a lengthened oval shape, and contains a slightly convex stone, longitudinally striated on both sides.

The bark of the trunk is whitish and similar to that of the young White Oak. The wood is fine-grained but tender, and its fibres are interwoven and collected in bundles; an arrangement characteristic of the genus. The alburnum of stocks growing upon dry and elevated lands is yellow: this complexion is considered by wheel-wrights as a proof of the superior quality of the wood, and has, probably, given rise to the name of Yellow Gum, which is sometimes given to this species.

Throughout the greater part of Virginia the Black Gum is employed for the naves of coach and waggon wheels; at Richmond, Baltimore, Philadelphia, etc., it is preferred for hatters' blocks, as being less liable to split; and in the Southern States it is used in the rice-mills for the cylinder which receives the cogs, by whose circulation the pestles are lifted and let fall upon the rice to separate it from the husk. These teeth are driven into mortices formed in the wood, and are strongly compressed by the reaction of its interwoven fibres. For its difficulty in splitting the Black Gum is chosen by shipwrights for the *cap*, or the piece which receives the topmast.

Such are the most important uses of this wood, which are equally well subserved by that of the Tupelo. Both species support the temperature of Paris, but they succeed better a few degrees farther south.

PLATE CX.

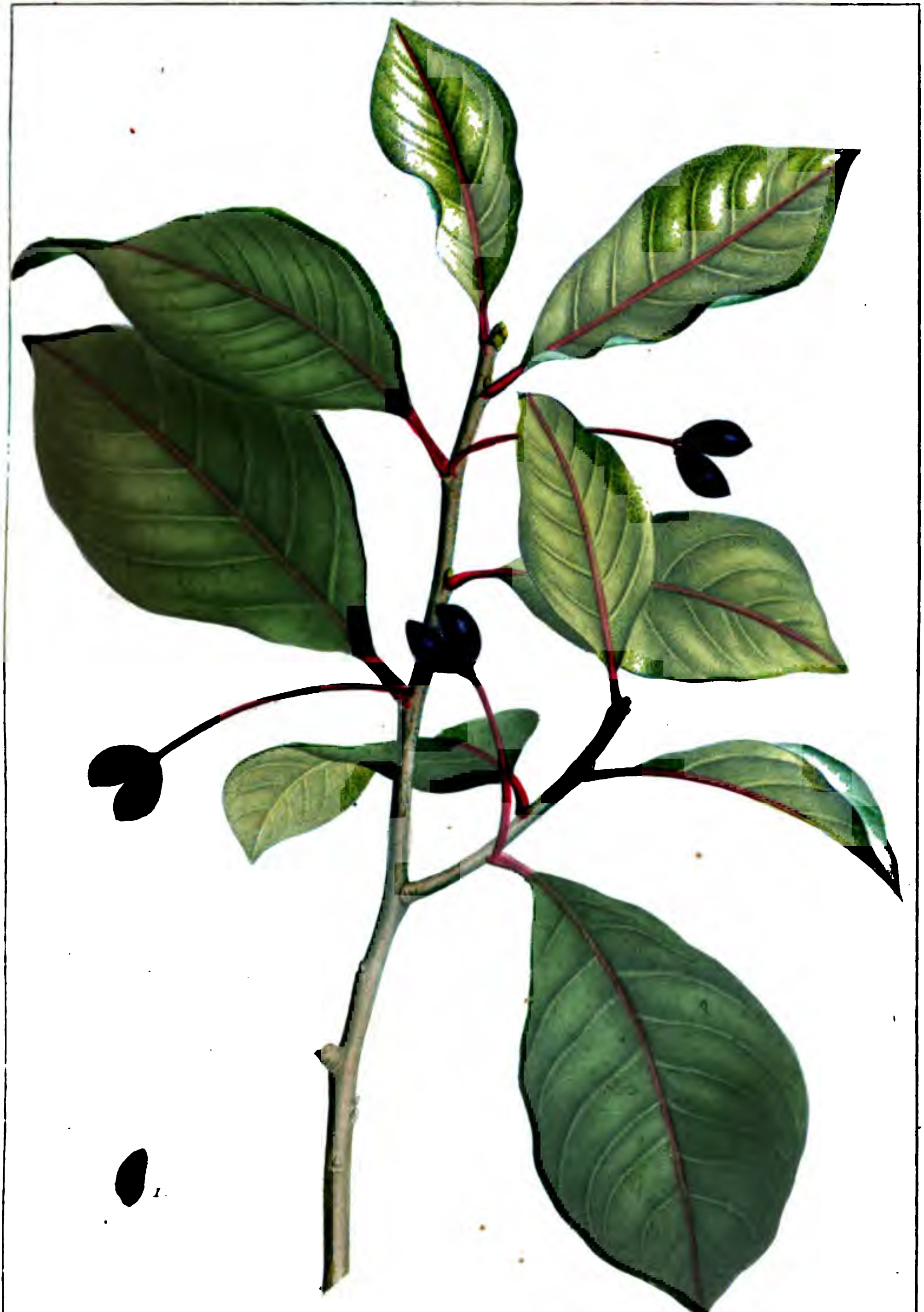
A branch with leaves and fruit of the natural size. Fig. 1, A stone separated from the pulp.

TUPELO.

Nyssa aquatica. *N. foliis ovalibus, integerrimis; pedunculis femineis bifloris; drupâ brevi, obovatâ; nuce striatâ.*

The Tupelo begins to appear in the lower part of New Hampshire, where the climate is tempered by the vicinity of the sea, but it is most abundant in the southern parts of New York, New Jersey and Pennsylvania. It is called indiscriminately Tupelo, Gum Tree, Sour Gum and Peperidge; names of whose origin and meaning I am ignorant. The first of these denominations is the most common, the second is wholly misapplied, as no self-condensing fluid distils from the tree, and the third is used only by the descendants of the Dutch settlers in the neighbourhood of New York.

The Tupelo grows only in wet grounds; in New Jersey it is constantly seen on the borders of the swamps with the Sweet Gum, the Swamp White Oak, the Chesnut White Oak and the White Elm. It rarely exceeds 40 or 45 feet in height, and its limbs, which spring at 5 or 6 feet from the ground, affect a horizontal direction. I have remarked that the shoots of the two preceding years are commonly simple, and widely divergent from the branches. The trunk is of an uniform size from its base: while it is less than 10 inches in diameter the bark is not remarkable, but on full-grown and vigorous stocks it is thick, deeply furrowed, and, unlike the



A. Rich. del. Gabriel Sc.

Tupelo.

Nyssa aquatica.

bark of any other tree, divided into hexagons, which are sometimes nearly regular.

The leaves are 3 inches long, oboval, smooth, slightly glaucous beneath, alternate, and often united in bunches at the extremity of the young lateral shoots. The flowers are small, scarcely apparent, collected in bunches and supported by petioles one or two inches in length. The fruit, which is always abundant, is of a deep blue colour, about the size of a pea, and attached in pairs. It is ripe towards the beginning of November, and persisting after the falling of the leaf it forms a part of the nourishment of the red-breasts in their autumnal migration to the south. The stone is compressed on one side, a little convex on the other, and longitudinally striated. Bruised in water this fruit yields an unctuous, greenish juice, of a slightly bitter taste, which is not easily mingled with the fluid. I do not know that any attempt has been made to convert it to economical uses, and I believe it would be difficult to obtain from it a spirituous liquor, or even to convert it into vinegar.

The Tupelo holds a middle place between trees with soft and those with hard wood. When perfectly seasoned the sap is of a light reddish tint, and the heart of a deep brown. Of trees exceeding 15 or 18 inches in diameter more than half the trunk is hollow; a fact which I have repeatedly witnessed.

The ligneous fibres which compose the body of trees in general are closely united, and usually ascend in a perpendicular direction. By a caprice of nature which it is impossible to explain, they sometimes pursue an undulating course, as in the Red and Sugar Maples, or, as in the last mentioned species, form ripplings so fine that the curves are only 1, 2 or 3 lines in diameter; or, lastly, they ascend spirally, as in the *Orme tortillard*, Twisted Elm, following the same bent for 4 or 5 feet. In these species, however, the deviation is only accidental, and to be sure of obtaining this form it must be perpetuated by grafting or by transplanting young stocks from the shade of the parent tree. The genus which we are considering exhibits, on the contrary, a constant peculiarity of organization; the fibres are united in bundles, and are interwoven like a braided cord; hence the wood is extremely difficult to split, unless cut into short billets. This property gives it a decided superiority for certain uses: in New York, New Jersey, and particularly at Philadelphia, it is exclusively employed for the naves of wheels destined for heavy burthens. It must be acknowledged that, in some parts of New Jersey and Pennsylvania, the White Oak is preferred, which, as I have already remarked, appears, from its liability to split, to be little calculated for this object. From the difference of opinion on this subject we may conclude that the Tupelo is esteemed solely for its difficulty in splitting, and not for its solidity and strength. The absence of these properties would be a still more essential defect in France, where the wheels of heavy vehicles have naves 20 inches in diameter at the insertion of the spokes, with an axle-tree of 350 pounds weight, and are laden for distant transportation with 9000 pounds, which is twice the burthen ever laid upon them in America. The Tupelo, therefore, from its inferiority in size and strength, can never be substituted for the Twisted Elm. But if to its own organization it joined the solidity of the Elm, a more rapid vegetation and the faculty of growing on dry and elevated lands and of expanding to three or four times its present dimensions, it would be the most precious to the mechanical arts of all the forest-trees of Europe and North America. In New Jersey and Pennsylvania many farmers prefer the Tupelo for the *side-boards* and bottom of carts, as experience has evinced its durability. Wooden bowls are made of it which are heavier than those of Poplar, but less liable to split. As a combustible it is esteemed for consuming slowly and diffusing a great heat: at Philadelphia many persons, in making their provision of wood for the winter, select a certain proportion of the Tupelo, which is sold separately for logs.

The preceding remarks will enable the Europeans to appreciate the value of the Tupelo, while they suggest to the Americans the importance of introducing the Twisted Elm.

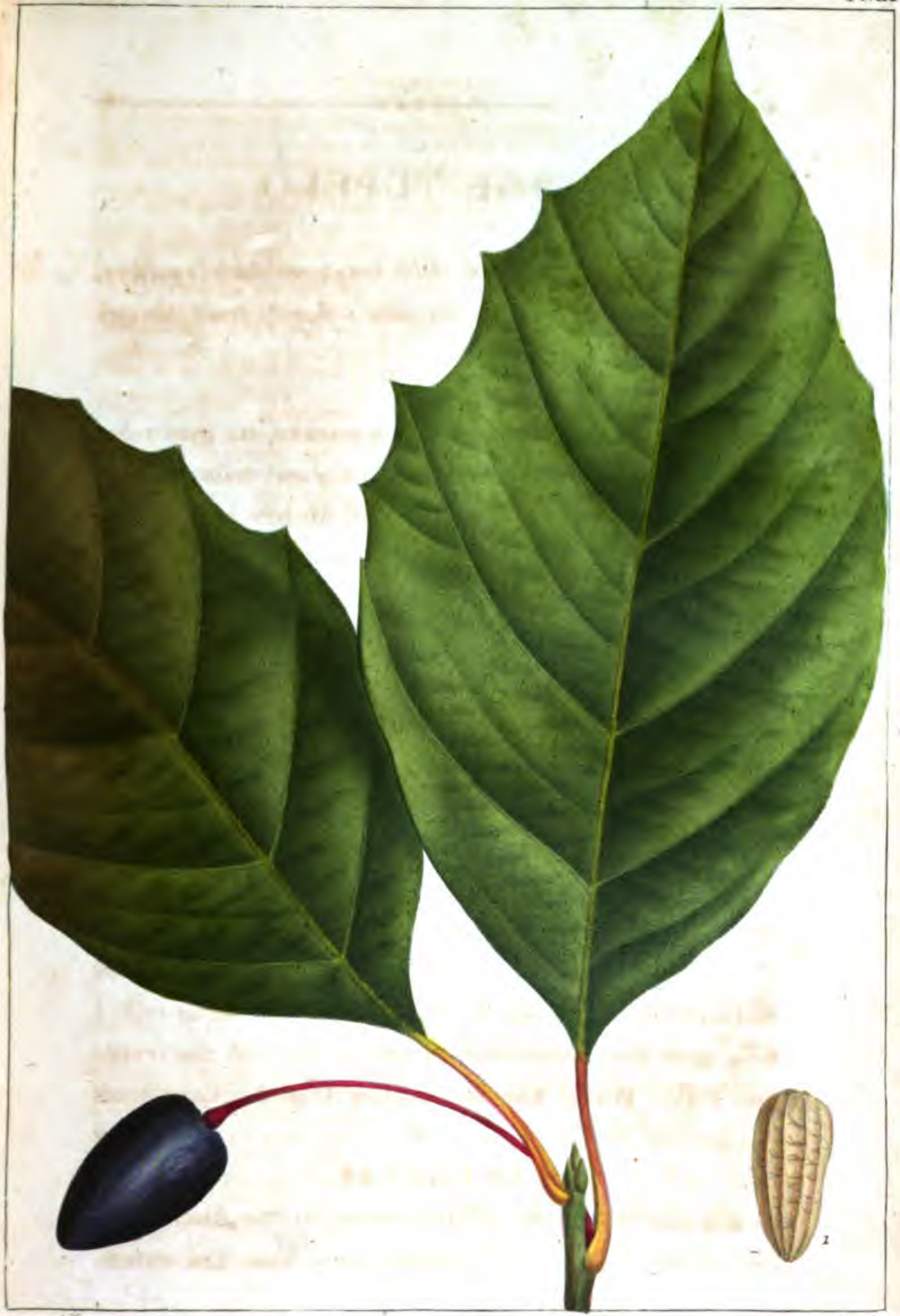
PLATE CXI.

A branch with leaves and fruit of the natural size. Fig. 1, *A stone separated from the pulp.*

LARGE TUPELO.

NYSSA GRANDIDENTATA. *N. foliis longè petiolatis, ovalibus, acuminatis; pedunculis femineis 1-floris; fructibus cæruleis.*

THIS is the most remarkable species of its genus for height and diameter. According to my own observations it is unknown to the Northern and Middle States, and is found only in the lower part of the Carolinas, of Georgia and of East Florida, where it is designated by the name of Large Tupelo. I have been assured that it abounds, also, in Lower Louisiana on the banks of the Mississippi, where it is called Wild Olive. In fine, it exists in all parts of the United States which produce the Long-leaved Pine. I am induced also to believe, though with less conclusive evidence of the fact, that it grows wherever we find the Cypress, and consequently that it extends northward beyond the limits of Virginia, as the Cypress abounds in the swamps of Maryland, at a little distance from the sea. In South Carolina and Georgia I have seen them constantly united, and, with the Over-cup Oak, Water Locust, Cotton Wood, Carolinian Poplar and Water Bitternut Hickory, they compose the dark and impenetrable forests which cover the miry swamps on the border of the rivers, to the distance of one or two hundred miles from the ocean. The exten-



Bessa del.

Joly Sculp.

Large Tupelo.

Nyssa grandidentata.

sive swamps still enclosed in the forests produce the same trees, whose presence is an infallible proof of the depth and fertility of the soil, and, consequently, of its fitness for the culture of rice.

The rivers, at their annual overflowing, sometimes cover these marshes to the height of 5 or 6 feet, as is shown by the marks left upon the trees by the retiring waters. Vegetation seems only to acquire new energy from these inundations, and the Large Tupelo sometimes attains the height of 70 or 80 feet with a diameter of 15 or 20 inches immediately above its conical base and 6 or 7 feet from the ground. This size continues uniform to the height of 25 or 30 feet : at the surface the trunk is 8 or 9 feet thick, which is a greater disproportion than we observed in the preceding species.

I cannot attribute this extraordinary swelling of the trunk entirely to the humidity of the soil; if such was the cause we should probably witness the phenomenon in other trees which accompany the Tupelos.

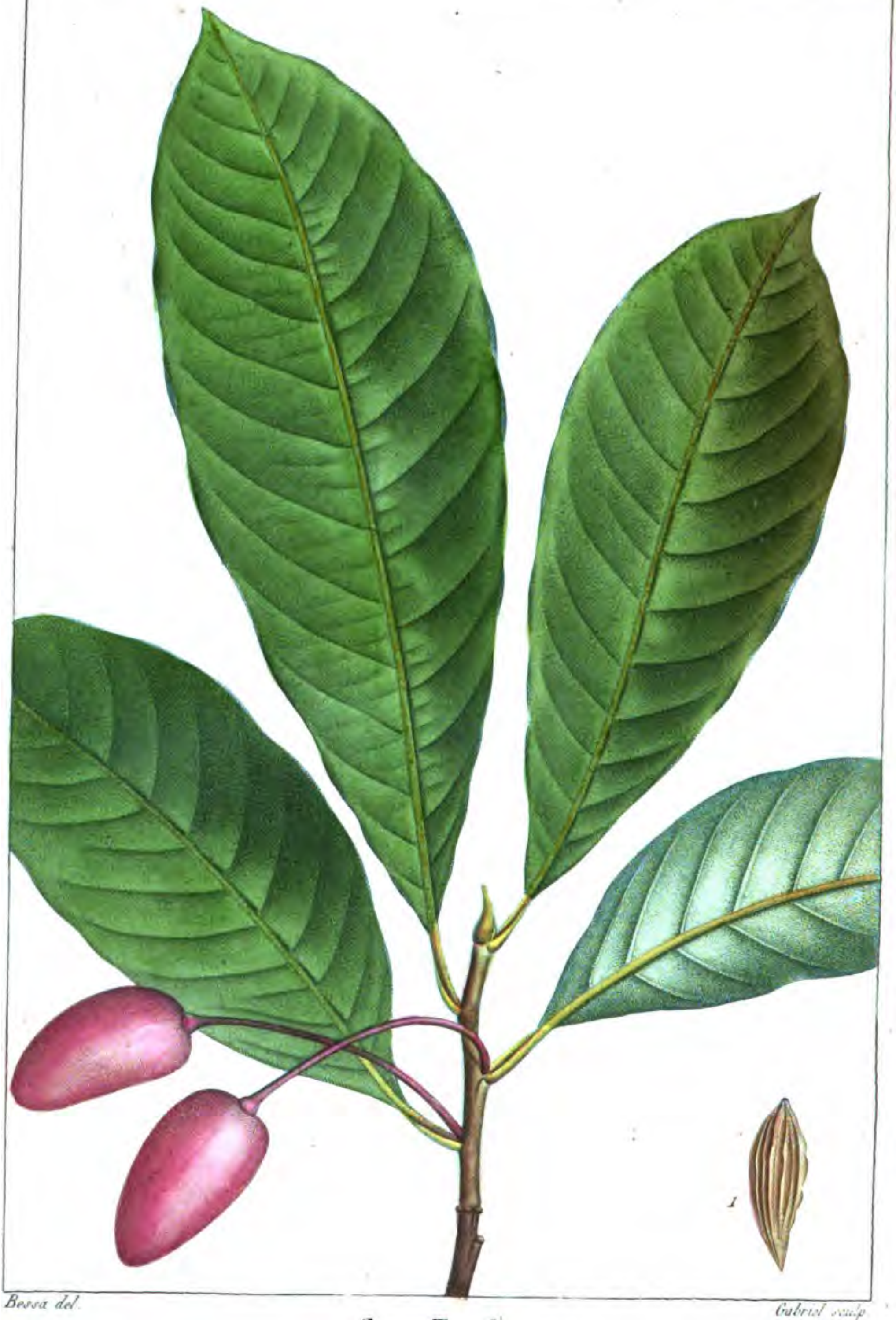
The leaves of the Large Tupelo are commonly 5 or 6 inches long and 2 or 3 inches broad; on young and thriving stocks they are of twice these dimensions. They are of an oval shape, and are garnished with two or three large teeth irregularly placed, and not opposite, like those of other leaves. At their unfolding in the spring they are downy, but they become smooth on both sides as they expand. The flowers are disposed in bunches, and are succeeded by a fruit of considerable size and of a deep blue complexion, of which the stone is depressed and very distinctly striated. Bruised in water this fruit yields a fine purple juice whose colour is tenacious; but the quantity is too minute to afford resources in dying.

The wood of the Large Tupelo is extremely light and softer than that of any tree of the United States with which I am acquainted. In the arrangement of its fibres it resembles the other species of the genus. Its only use is for bowls and trays, for which it is well adapted as it is wrought with facility. Its roots, also, are tender and light, and are sometimes employed by fishermen to buoy up their nets : but no part of the tree affords a substitute for cork.

The only merit of this species resides in its agreeable form and beautiful foliage. It endures the temperature of Paris, and does not exact, in Europe, as moist a soil as it constantly requires in the United States.

PLATE CXII.

A branch with leaves and fruit of the natural size. Fig. 1, *A stone separated from the pulp.*



Bessa del. *Gabriel sculp.*

Sour Tupelo.

Nyssa capitata.

SOUR TUPELO.

Nyssa capitata. *N. foliis brevissimè petiolatis, subcuneato-oblongis, subtùs subcandicantibus; pedunculis fœmineis 1-floris; fructibus rubris.*

The Sour Tupelo first makes its appearance on the river Ogechee, near the road from Savannah to Sunbury, and in going southward it is seen in every favourable situation. I have been told that it exists in Lower Louisiana, which is probable from the analogy in soil and climate between the ancient Southern States and the country watered by the lower part of the Mississippi.

In Georgia this tree is known by the name of Sour Tupelo and Wild Lime, the first of which I have preferred, though the last is more common, because this vegetable bears no resemblance to the Lime Tree in the form of its leaves or of its flowers.

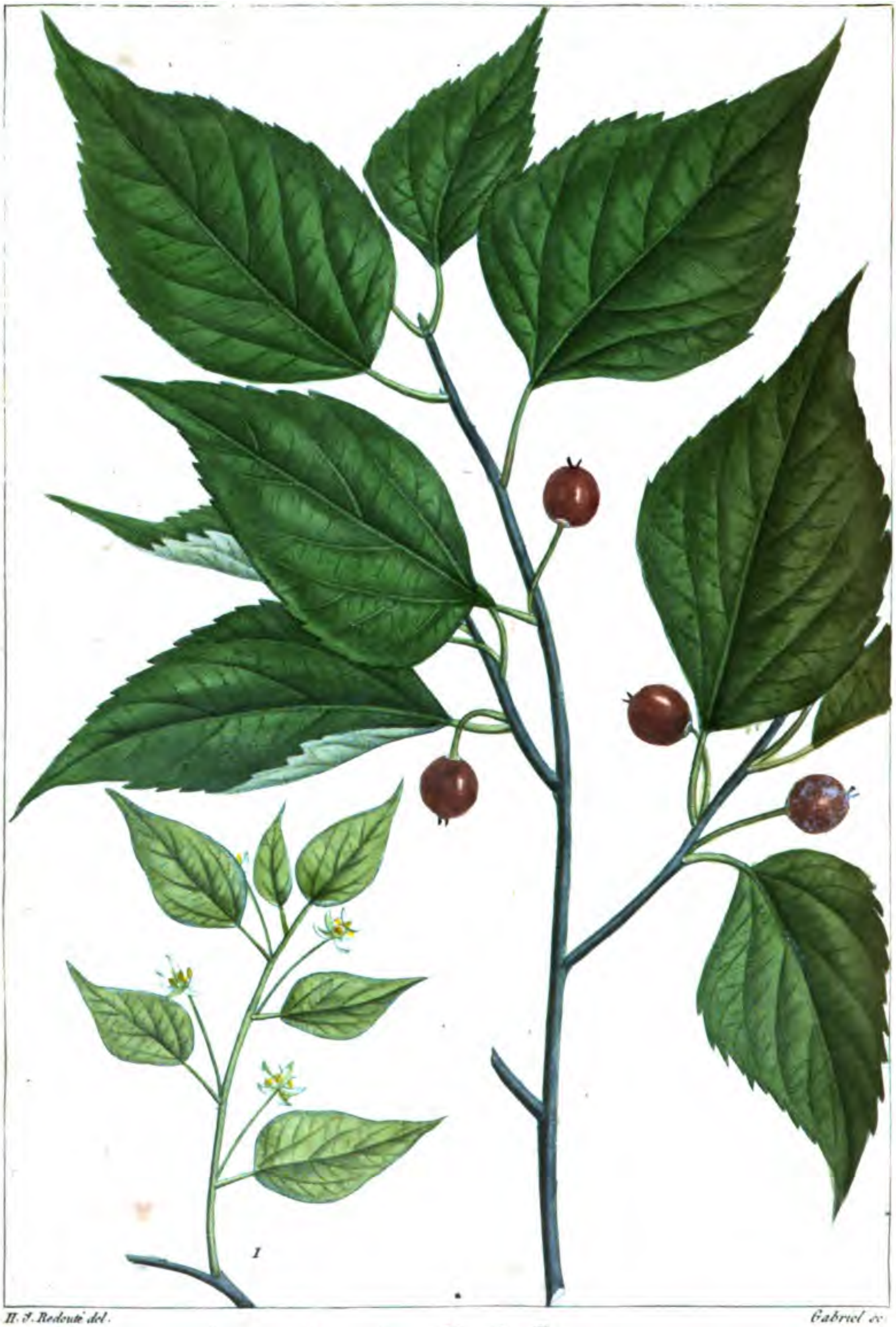
The leaves are 5 or 6 inches long, oval, rarely denticulated, of a light green above and glaucous beneath. The flowers are similar to those of the Large Tupelo, but the sexes are borne by separate stocks, and I have remarked, as a peculiarity witnessed in no other tree of North America, that the male and female trees are easily distinguished by their general appearance when the leaves are fallen. The branches of the male are more compressed about the trunk, and rise in a direction more nearly perpendicular; those of the female diffuse themselves horizontally and form a larger and rounder summit.

The fruit is supported by long petioles, and is from 15 to 18 lines in length, of a light red colour and of an oval shape. It is thick-skinned, intensely acid, and contains, like that of the Large Tupelo, a large oblong stone deeply channelled on both sides. An agreeable acidulous beverage might be made of it; but the Lime Tree, which is found in the same country, is superior in the size and abundance of its fruit, and has, besides, the advantage of flourishing on barren, sun-beaten lands.

This species is the smallest of the Tupelos, being rarely more than 30 feet high and 7 or 8 inches in diameter. It accompanies the Large Tupelo in the swamps which are found upon the borders of the rivers or in the midst of the forests. As its wood is soft and its dimensions too small to be applicable in the arts, it falls exclusively within the province of the amateurs of exotic plants.

PLATE CXIII.

A branch with leaves and fruit of the natural size. Fig. 1, *A stone separated from the pulp.*



H. J. Redouté del.

Gabriel sc.

American Nettle Tree.

Celtis occidentalis.

AMERICAN NETTLE TREE.

Polygamia diœcia. Linn. Amentaceæ. Juss.

Celtis occidentalis. *C. foliis ovatis, acuminatis, serratis, basi inæqualibus, suprà scabris, subtùs hirtis; fructibus rubris.*

The American Nettle Tree, if not rare, is little multiplied in comparison with the Oaks, the Walnuts and the Maples. As it is scattered singly through the forest, it is difficult to fix the point at which it ceases towards the North, but I believe it is not found beyond the river Connecticut. In the Middle, Western and Southern States it bears the name which I have adopted, and among the French of Illinois, that of *Bois inconnu*, Unknown wood.

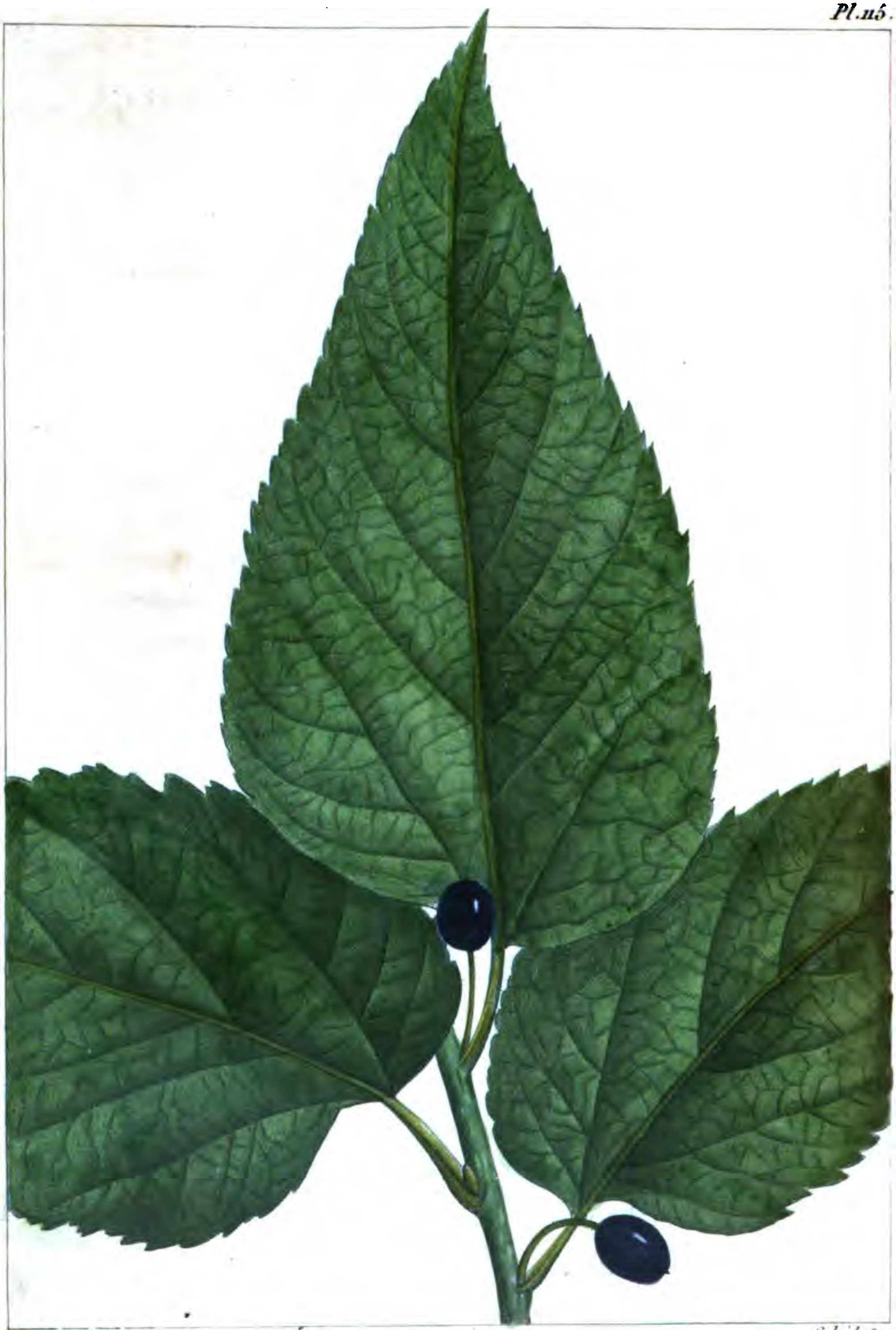
The Nettle Tree prefers a cool and shady situation, with a deep and fertile soil: I have observed the largest stocks on the banks of the Savannah, some of which were 60 or 70 feet high and 18 or 20 inches in diameter. This species is similar in its foliage and general appearance to the European Nettle Tree; the branches of both are numerous and slender, and the limbs take their rise at a small distance from the ground and seek a horizontal or an inclined direction. The leaves are alternate, about 3 inches long, of a dark green colour, oval-oblique at the base, very acuminate at the summit, denticulated, and somewhat rough. The flowers open early in the spring, and are small, white, single and axillary: the fruit, also, is small and single, of a round form, and of a dull red colour.

The bark is rough and entire upon the trunk, and smooth and even on the secondary branches. I have never seen the wood employed in any part of the United States and cannot speak of its uses; as the American and European species are analogous in other respects, they are probably alike in the properties of their wood.

The European Nettle Tree is a robust vegetable which endures the most inclement weather, bears transplanting without injury, and grows with rapidity in almost every soil. When perfectly seasoned the wood is of a dark brown colour, hard, compact, supple and tenacious: it makes excellent hoops, whip-stocks and ramrods, is used by wheel-wrights for shafts and for other purposes, and is proper for sculpture. The Ancients assert that it is durable and secure from worms.

PLATE CXIV.

A branch with leaves and fruit of the natural size. Fig. 1, *A sprig with flowers.*



H. J. Redouté del.

Gabriel sc.

Hack Berry.

Celtis crassifolia.

HACK BERRY.

CELTIS CRASSIFOLIA. *C. foliis subcordatis, serratis, acuminatis; fructibus nigris.*

THE banks of the Delaware above Philadelphia may be considered as the north-eastern limit of the Hack Berry. East of the mountains it is restricted within narrow boundaries, and is a stranger to the lower part of Virginia and to the more Southern States: I have found it abundant only on the banks of the Susquehannah and of the Potowmack, particularly on the Susquehannah near Columbia and Harrisburgh. It is profusely multiplied, on the contrary, in the Western Country in all the vallies that stretch along the rivers, and wherever the soil is fertile throughout Kentucky and Tennessee. On the Ohio, from Pittsburgh to Marietta, it is called Hoop Ash, and in Kentucky, Hack Berry; a name whose origin I am unable to trace.

This is one of the finest trees that compose the dusky forests on this part of the Ohio. It associates with the Button Wood, Black Walnut, Butternut, Bass Wood, Black Sugar Maple, Elm and Sweet Locust, which it equals in stature but not in bulk, being sometimes more than 80 feet high with a disproportionate diameter of 18 or 20 inches.

The Hack Berry is easily distinguished by the form of its trunk, which is straight and undivided to a great height, and by its bark, which is greyish, unbroken and covered with asperities unequally distributed over its surface. Its leaves are larger than those of any other species of Nettle Tree, being 6 inches long and 3 or 4 inches broad. They are oval-acuminate, denticulated, cordiform at the base, of a thick, substantial texture, and of a rude surface. The flowers are small, white, and often united in pairs on a common peduncle. The fruit is round, about as large as a pea, and black at its maturity. The wood is fine-grained and compact, but not heavy, and when freshly exposed it is perfectly white: sawn in a direction parallel or oblique to its concentrical circles it exhibits the fine undulations that are observed in the Elm and the Locust. On laying open the sap of this tree in the spring, I have remarked, without being able to account for the phenomenon, that it changes in a few minutes from pure white to green. On the Ohio and in Kentucky, where the best opportunity is afforded of appreciating this wood, it is little esteemed on account of its weakness and its speedy decay when exposed to the weather. It is rejected by wheelwrights, but is sometimes employed in building for the covering which supports the shingles. As it is elastic and easily divided it is used for the bottom of common chairs, and by the Indians for baskets. On the banks of the Ohio it is frequently taken for the rails of rural fence, and is wrought with the greatest ease, as it is straight-grained and free from knots : it is said also to afford excellent charcoal.

The Hack Berry is certainly one of the most beautiful trees of its genus, and one of the most remarkable for height and for majesty of form. In rich soils the luxuriance of its vegetation is shown by sprouts 6, 8 and 10 feet in length, garnished on each side with large, substantial leaves. In France it is principally esteemed for the rapidity of its growth, and it is to be wished that its wood may be found valuable enough to entitle it to a place in our forests.

PLATE CXV.

A branch with leaves and fruit of the natural size.

RED MULBERRY.

Monœcia tetrandria. Linn. **Urticæ. Juss.**

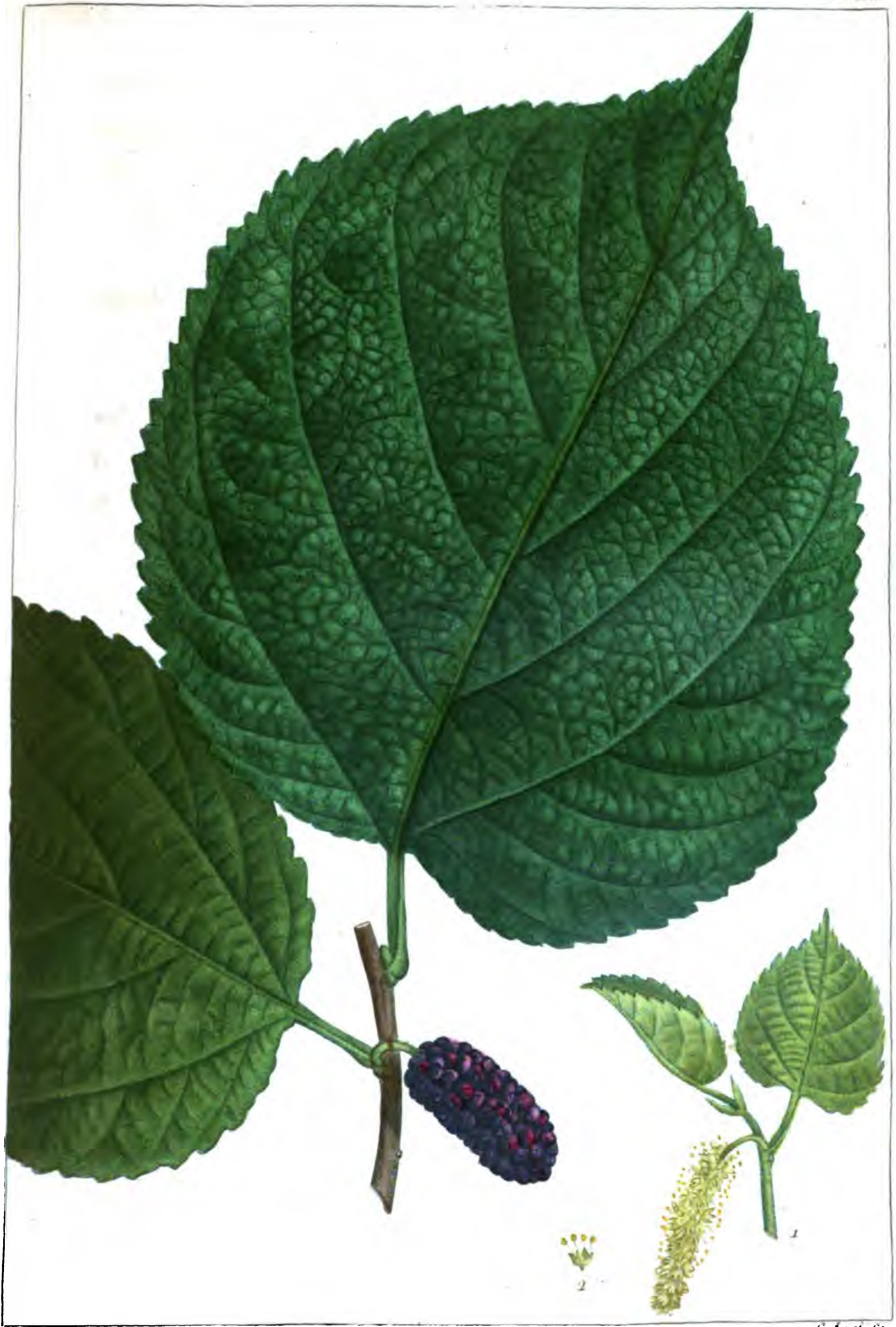
Morus rubra. *M. foliis cordatis, orbiculatis trilobisve, æqualiter serratis, scabris; spicis femineis cylindricis.*

The northern extremity of lake Champlain and the banks of the river Connecticut, which I have assigned as the limits of the Tulip Tree, may also be assumed as those of the Red Mulberry. As a temperate climate is favourable to its increase, it is more multiplied farther south; but in the Atlantic States it is proportionally less common than many other trees which still do not constitute the mass of the forests: the Sweet Gum, the Tulip Tree, the Sassafras, the Red Beech and the Maples are far more abundant.

In the lower part of the Southern States this tree is much less frequently seen than at a distance from the sea, where the soil and vegetable productions wear a different character. I have found it most abundant in the States of Ohio, Kentucky and Tennessee, and on the banks of the Wabash, the Illinois and the Missouri; which is attributable to the superior fertility of the soil.

In these regions, and in the upper parts of Pennsylvania and Virginia, the Red Mulberry often exceeds 60 or 70 feet in height and 2 feet in diameter. Its leaves are large, sometimes entire, and sometimes divided into

Pl. 116



Bessa del.

Gabriel Sc.

Red Mulberry.

Morus rubra.

2 or 3 lobes, rounded, cordiform and denticulated, of a dark green colour, a thick texture and a rough, uneven surface.

The sexes are usually separate, though sometimes they are found upon the same tree. The male flowers form pendulous, cylindrical aments, about an inch in length; the female blossoms are small and scarcely apparent; the fruit is of a deep red colour, an oblong form and an agreeable, acidulous, sugary taste: it is composed by the union of a great number of small berries, each of which contains a minute seed.

The trunk of the Red Mulberry is covered with a greyish bark more furrowed than that of the Oaks and the Hickories. The perfect wood is of a yellowish hue, approaching to lemon colour. The concentrical circles are distant and distinct; the wood is, nevertheless, fine-grained and compact, though lighter than that of the White Oak. It possesses strength and solidity, and, when perfectly seasoned, it is almost as durable as the Locust, to which, by many persons, it is esteemed perfectly equal. At Philadelphia, Baltimore, and in the more southern ports, as much of it as can be procured is employed for the upper and lower parts of the frame of vessels, for the knees, the floor-timbers, and, in preference to every other wood except the Locust, for trunnels. But it grows more slowly, requires a richer soil, and is less multiplied than the Locust, and it is found in the ship-yards in a smaller proportion than any other timber. In South Carolina it is selected for the ribs of the large boats in which the productions of the upper districts of both Carolinas are brought down the Catawbaw. For posts it is almost as durable and as much esteemed as the Locust. Such are its most important uses, which should engage the American proprietors to preserve with care the stocks growing naturally on their estates:

It is a common opinion among ship-wrights and carpenters that the wood of the male Mulberry is more durable and of a better quality than that of the female: I must be pardoned for considering this opinion as a prejudice till experiments have demonstrated its truth. In America, as well as in Europe, unlearned people fall into the same error concerning the Mulberry Tree as concerning Hemp, of giving the name of male to the productive and of female to the barren plant, so that if a difference is shown to exist, it is the female tree which affords the best timber.

The Black Mulberry of Europe, which bears a great resemblance to the Red Mulberry, and whose fruit is three or four times as large, would be a valuable acquisition to the Middle and still more to the Western States, where it would flourish in perfection. The fruit of the American species, too, might easily be augmented in size and quantity by careful cultivation; a very sensible improvement is witnessed in trees left standing in cultivated fields.

As the leaves of both these species are thick, rough and hairy while young, they are improper for the nourishment of silk-worms, which feed only on the smooth, thin and tender foliage of the White Mulberry. On several deserted plantations 15 or 20 miles from Savannah are seen large White Mulberries, which were set out a century ago, when attempts were made to introduce the raising of silk-worms. Experience quickly detected the error of the calculation: this branch of industry is adapted only to a populous country, where there are hands not required for the cultivation of the earth that may be employed in manufactures so as to afford their products at moderate prices. In the United States this period is still remote; the extensive and scarcely inhabited regions of Upper Louisiana, favoured with a fertile soil and a genial climate, will offer resources to the redundant population of the Atlantic and Western States. These regions will probably produce the finest silk, as their soil and climate are peculiarly adapted to the White Mulberry.

The Red Mulberry has been cultivated for many years in France and England, where it succeeds perfectly and is esteemed for its thick and shady foliage. The excellent properties of its wood should induce the Europeans to propagate it in their forests.

PLATE CXVI.

A branch with leaves and fruit of the natural size. Fig. 1, A young shoot with a barren ament. Fig. 2, A barren flower detached from the ament.

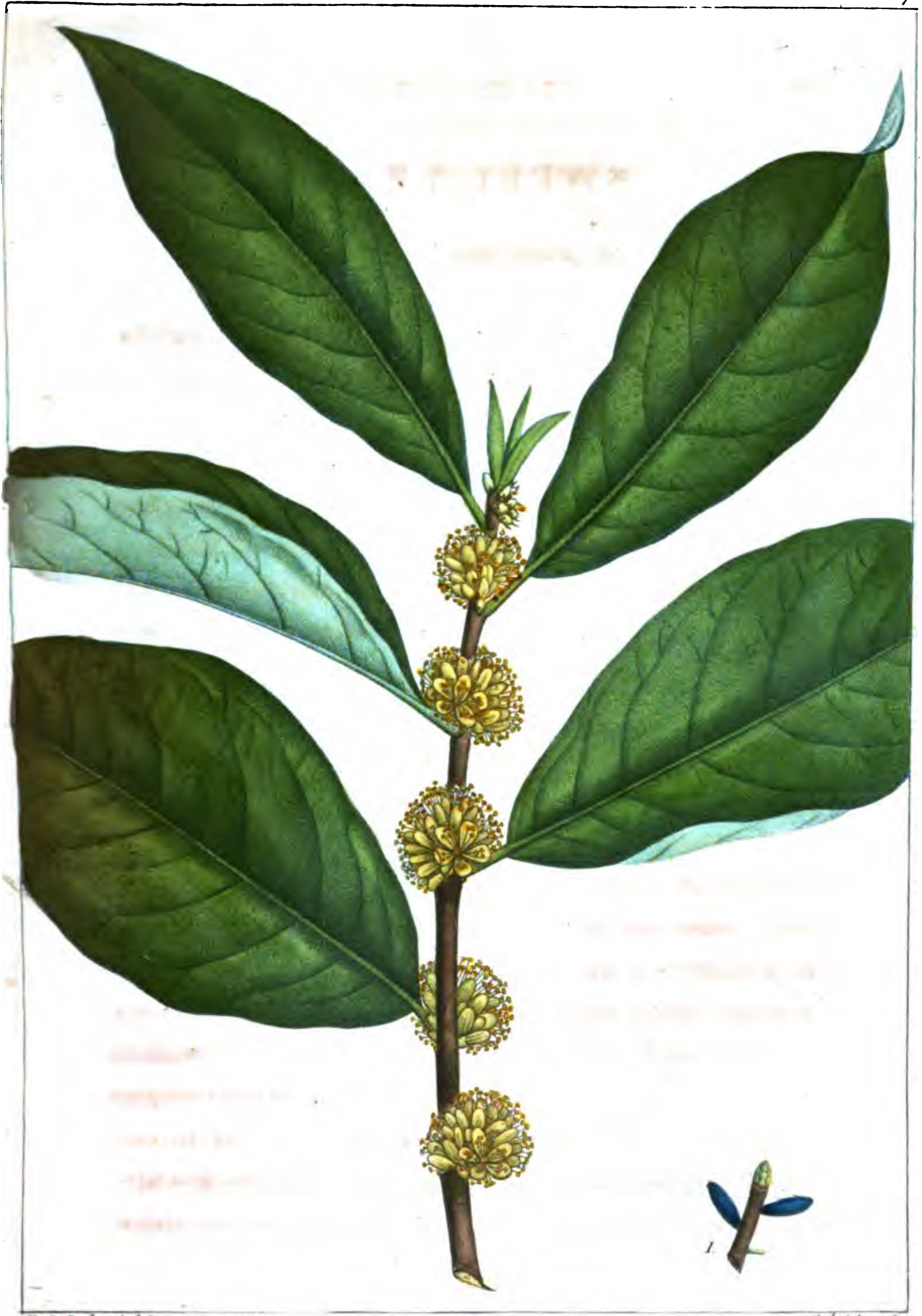
SWEET LEAF.

Polyadelphia polyandria. Linn.   Guaiacanæ. Juss.

HOPEA TINCTORIA. *H. foliis lanceolato-ovatis, subserratis, nitidis; floribus luteis; fructibus cæruleis.*

I first observed the Sweet Leaf near Petersburgh in Virginia. It is common in West Tennessee and in the upper part of the Carolinas and of Georgia; but it is still more abundant within the limits which I have assigned to the *pine-barrens*, where the soil is light and the winter less rigorous than at a greater distance from the sea.

This tree is known only by the name of Sweet Leaf. It varies in size according to the situation in which it grows: on the banks of the Savannah and on the borders of the large swamps, where the soil is deep, loose and fertile, I have seen it 25 or 30 feet high and 7 or 8 inches in diameter at the height of 5 feet. Commonly it does not exceed half these dimensions, and in the *pine-barrens*, where it is profusely multiplied, it is sometimes only 3 or 4 feet in height. The sprouts from the trunks consumed in the annual conflagration of the forests never surpass this height, and, as they do not fructify, the tree is multiplied by its running roots, which shoot at the distance of a few feet.



H. J. Redouté del.

Gabriel sculp.

Sweet Leaf.

Hopea tinctoria.

The trunk of the Sweet Leaf is clad in a smooth bark, and, if wounded in the spring, it distils a milky fluid of an unpleasant odour. The wood is not hard and is totally useless. The leaves are 3 or 4 inches long, smooth thick, alternate, of an elongated oval shape, slightly denticulated, and of a sugary taste. In sheltered situations they persist during two or three years, but in the *pine-barrens* they turn yellow with the first frost and fall towards the beginning of February. In the meantime they are eagerly devoured by horses and cows turned loose into the forests after the herbage has perished.

The flowers spring from the base of the leaves, and appear early in the season: they are yellowish, sweet-scented, and composed of a great number of stamina shorter than the petals and united in separate groups at the base. The fruit is cylindrical, minute, and of a deep blue colour at its maturity.

The foliage is the only part of this tree which promises to be of any utility; when dry it affords, by decoction, a beautiful yellow colour, which is rendered permanent by the addition of a little alum and is used to dye wool and cotton. But if these leaves had possessed any considerable value they would doubtless have found their way into commerce. The first obstacle to their use is the expense, in a country where labour is dear, of collecting them in sufficient quantities. Of this I can judge from the difficulty I experienced in collecting a few pounds.

PLATE CXVII.

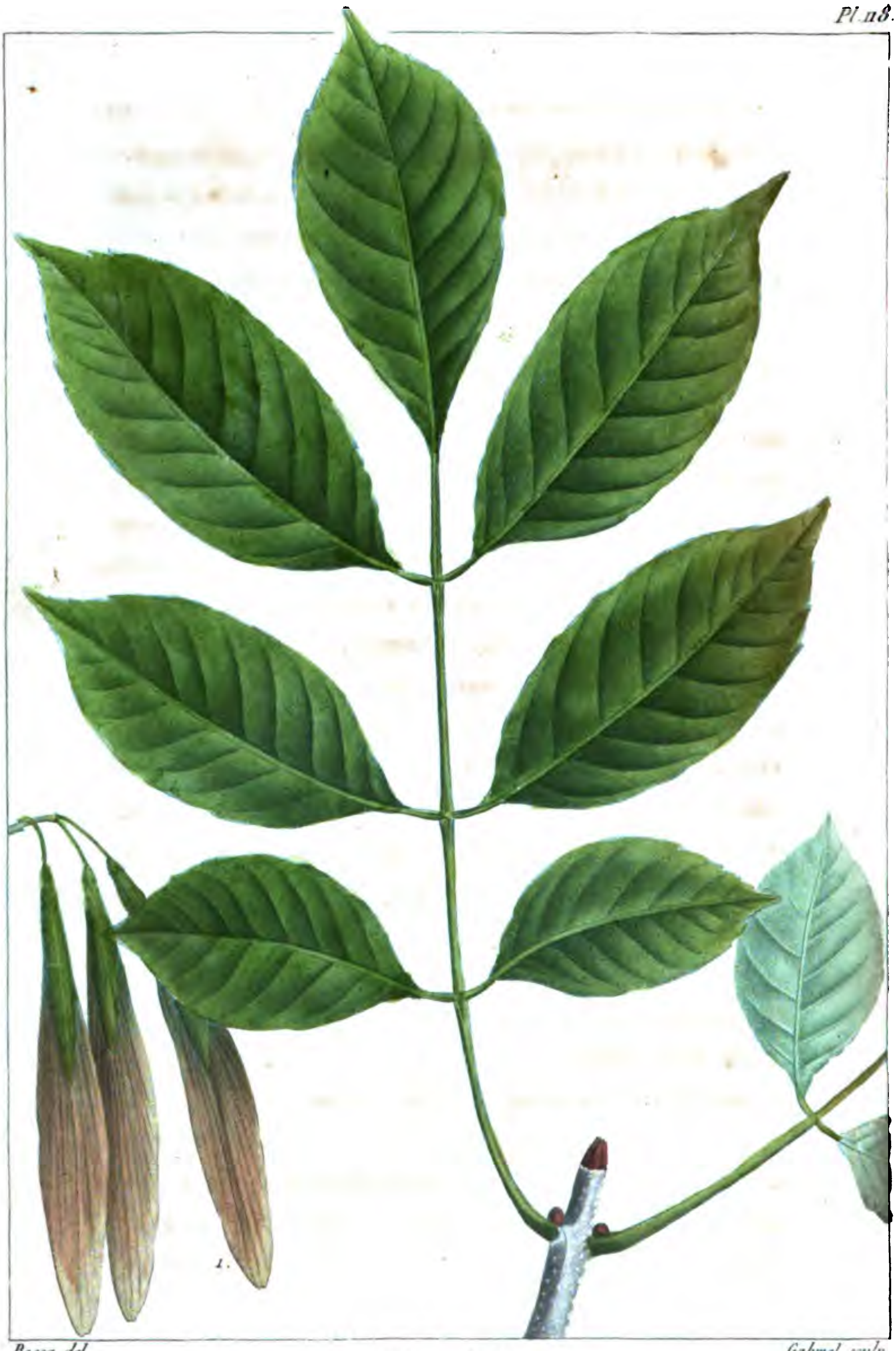
A branch with leaves and flowers of the natural size. Fig. 1, A young shoot with fruit of the natural size.

ASHES.

Except the Oak, no tree of Europe or of North America is so generally useful as the Ash. The distinguishing properties of its wood are strength and elasticity; and it unites them in so high a degree, that, for many valuable purposes, it could be but imperfectly replaced by any other tree. This remark is particularly applicable to the Common Ash of Europe and to the White Ash of the United States, which are the largest species, the most multiplied, and the most useful in the arts.

Eight species of Ash are mentioned by botanists as indigenous to Europe, and a much greater number exist in America, as I am convinced by my own observations, and by examples, contained in my father's herbarium or cultivated in our gardens and nurseries, of species which have escaped my researches in America. Probably more than thirty species will be found east of the Mississippi.

As a close analogy reigns throughout this genus, each species should be raised from the seed, in order to study the developement of its vegetation as well as the characters of its flowers and its fruit. By observing them while young, we shall be able to ascertain the comparative rapidity of their growth. My residence in the United States was not long enough for the execution of this interesting task; I have confined myself, therefore, to the description of those species which are the most remarkable for their utility or for the form of their seeds.



Bessa del.

Gabriel sculp.

White Ash.

Fraxinus americana.

WHITE ASH.

Polygamia diœcia. Linn. Jasminæ. Juss.

Fraxinus americana. *F. foliis integerrimis, longè acuminatis, petiolatis, subtùs glaucis.*

The White Ash is one of the most interesting among the American species for the qualities of its wood, and the most remarkable for the rapidity of its growth and for the beauty of its foliage. It abounds in New Brunswick and Canada; in the United States it is most multiplied north of the river Hudson, and is more common in Gennessee than in the southern parts of New York, in New Jersey and Pennsylvania. A cold climate seems most congenial to its nature. It is everywhere called White Ash, probably from the colour of the bark, by which it is easily distinguished. I have observed, too, that on large stocks the bark is deeply furrowed, and divided into small squares from 1 to 3 inches in diameter.

The situations most favourable to the White Ash are the banks of rivers and the edges and surrounding acclivities of swamps. It sometimes attains the height of 80 feet with a diameter of 3 feet, and is one of the largest trees of the United States. In the District of Maine and in the upper part of New Hampshire it is always accompanied by the White Elm, Yellow Birch, White Maple, Hemlock Spruce and Black Spruce; and in New

Jersey it is mingled with the Red Maple, Shell-bark Hickory and Buttonwood, in places that are constantly wet and occasionally inundated.

The White Ash is a fine tree with a trunk perfectly straight and often undivided to the height of more than 40 feet. The leaves are 12 or 14 inches long, opposite, and composed of three or four pair of leaflets surmounted by an odd one. The leaflets, which are borne by short petioles, are 3 or 4 inches long, about 2 inches broad, oval-acuminate, rarely denticulated, of a delicate texture and an undulated surface. Early in the spring they are covered with a light down, which gradually disappears, and at the approach of summer they are perfectly smooth, of a light green colour above and whitish beneath. As the contrast of colour between the surfaces is remarkable, and is peculiar to this species, Dr. Muhlen berg has denominated it *Fraxinus discolor.*

The seeds are 18 inches long, cylindrical near the base, and gradually flattened into a wing, the extremity of which is slightly notched. They are united in bunches 4 or 5 inches long, and are ripe in the beginning of autumn. The shoots of the two preceding years are of a bluish grey colour and perfectly smooth: the distance between their buds sufficiently proves the vigour of their growth.

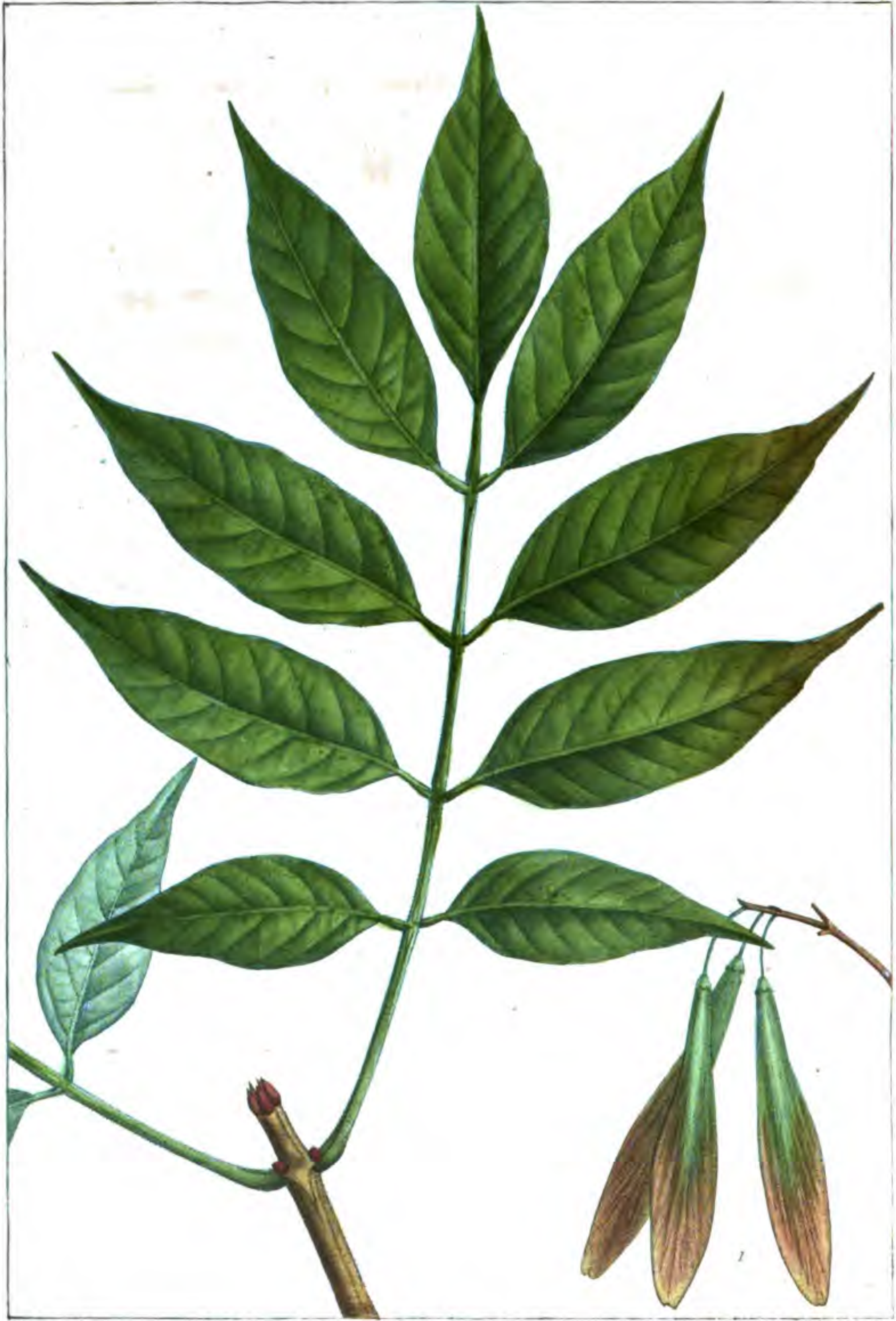
In large trees the perfect wood is reddish and the sap is white. This wood is highly esteemed for its strength, suppleness and elasticity, and is employed with advantage for a great variety of uses of which I shall mention only the most common. It is always selected by coachmakers for shafts, for the felloes of wheels, and at New York and Philadelphia for the frame of carriage-bodies; by wheel-wrights it is used for sledges and for the handles of wheel-barrows; in the District of Maine it replaces the White Oak for the circular back of windsor-chairs; scythe and rake handles, the hoops of water-pails, the circular piece of butter-boxes, sieves and large spinning-wheels, which are manufactured principally at Hingham near Boston, are of White Ash; and in Connecticut it is usually preferred for wooden bowls. In the District of Maine it is extensively used for staves, which are of a quality between those of White and those of Red Oak, and are esteemed the best for containing salted provisions. It is admitted also into the lower frame of vessels, but is considered inferior to the Yellow Birch and to the heart of the Red Beech. In all the Atlantic States the blocks used in ships and the pins for attaching the cordage are of Ash, for which purpose the White Ash is employed in the northern and the Red Ash in the southern ports. On account of its strength and elasticity, the White Ash is esteemed superior to every other wood for oars and second only to the Hickory for *hand-spikes*. In these forms it is exported to England and to the West Indies. It is also sent to England in planks, and is acknowledged by Oddy, in his treatise on European Commerce, to be superior in many respects to the Common Ash.

The White Ash has long been known in France, England and Germany, where it is propagated with success from the seed and by grafting; I have even remarked that in moist grounds its vegetation is more rapid than that of any indigenous species: its leaves are, at the same time, less liable to injury from the spanish-fly. Besides the beauty of its foliage, in which it surpasses the Common European Ash, it may be recommended for the excellence of its wood as a valuable acquisition to the north of Europe.

PLATE CXVIII.

A branch with leaves of half the natural size. Fig. 1, *Seeds of the natural size.*

Pl. 119.



Bessa del.

Gabriel sculp.

Red Ash.

Fraxinus tomentosa

RED ASH.

Fraxinus pubescens. Linn.

Fraxinus tomentosa. *F. foliolis subnovenis, dentatis, petiolatis; ramulis petiolisque pubescenti-tomentosis.*

Of all the Ashes this species is the most multiplied in Pennsylvania, Maryland and Virginia. It is commonly called Red Ash, and frequently Ash. Like the White Ash it prefers swamps and places frequently inundated or liable to be covered with water by copious rains, and in these situations it is accompanied by the Shell-bark Hickory, Bitternut Hickory, Swamp White Oak, Red Maple, Sweet Gum and Tupelo.

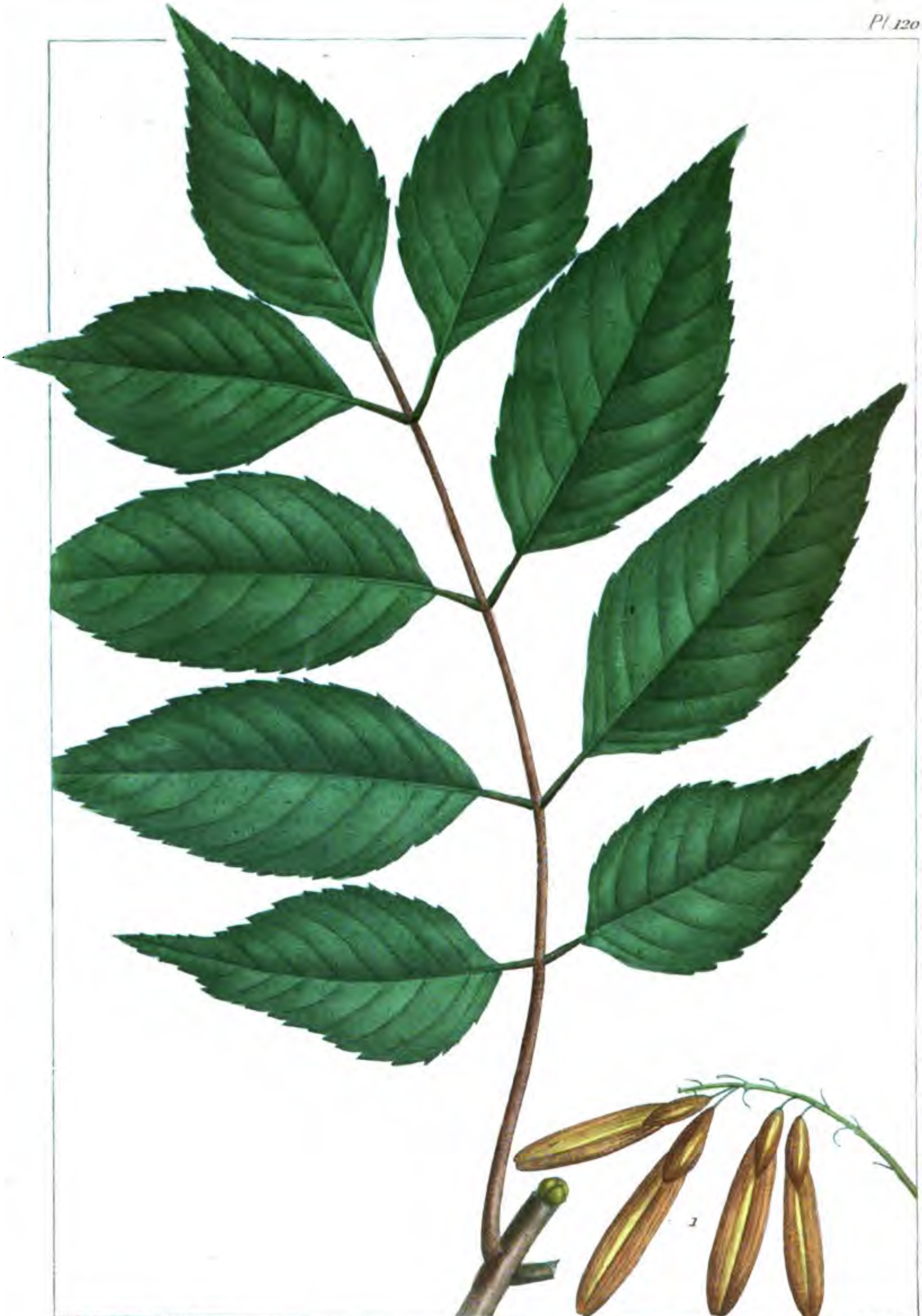
The Red Ash is a beautiful tree, rising perpendicularly to the height of 60 feet with a diameter of 15 or 18 inches. It is inferior to the White Ash not only in size but in the rapidity of its growth; the length of the annual shoots and the distance of the buds are but half as great as in the preceding species.

The leaves are from 12 to 15 inches long and are composed of three or four pair of very acuminate, denticulated leaflets, with an odd one. Their lower surface, as well as the shoots of the same season to which they are attached, is covered with thick down: on insulated trees this down is red at the approach of autumn, whence, probably, is derived the name of Red Ash. The seeds are shorter than those of the White Ash, but similar in form and arrangement.

The bark upon the trunk is of a deep brown, and the perfect wood is of a brighter red than that of the White Ash. The wood of this species possesses all the properties for which the other is esteemed, and in the ports of the Middle and Northern States they are indifferently applied to the same diversified uses; that of the Red Ash, however, is somewhat harder and consequently less elastic. Notwithstanding its inferiority of size, the Red Ash is perhaps more valuable for the regions to which it has been assigned by Nature: of this the Americans will be able to judge by experience; both species are of such general utility that the utmost pains should be bestowed upon their preservation and increase.

PLATE CXIX.

A branch with leaves of half the natural size. Fig. 1, *Seeds of the natural size.*



H. J. Redouté del.

Gabriel sculp.

Green Ash.
Fraxinus viridis.

GREEN ASH.

Fraxinus juglandifolia. Linn.

Fraxinus viridis. *F. foliis septenis, dentatis, petiolatis, viridibus; ramulis petiolisque glabris.*

The Green Ash is more common in the western districts of Pennsylvania, Maryland and Virginia than in any other part of the United States; but even here it is less multiplied than the White Ash and the Black Ash. Dr. Muhlen berg has particularly observed it on the islands of the Susquehannah near Columbia, and I have found it most abundant on the banks of the Mononghahela and the Ohio between Brownsville and Wheeling. Probably this species is of moderate dimensions, for I have seen it laden with seeds while only 25 or 30 feet high, and 4 or 5 inches in diameter.

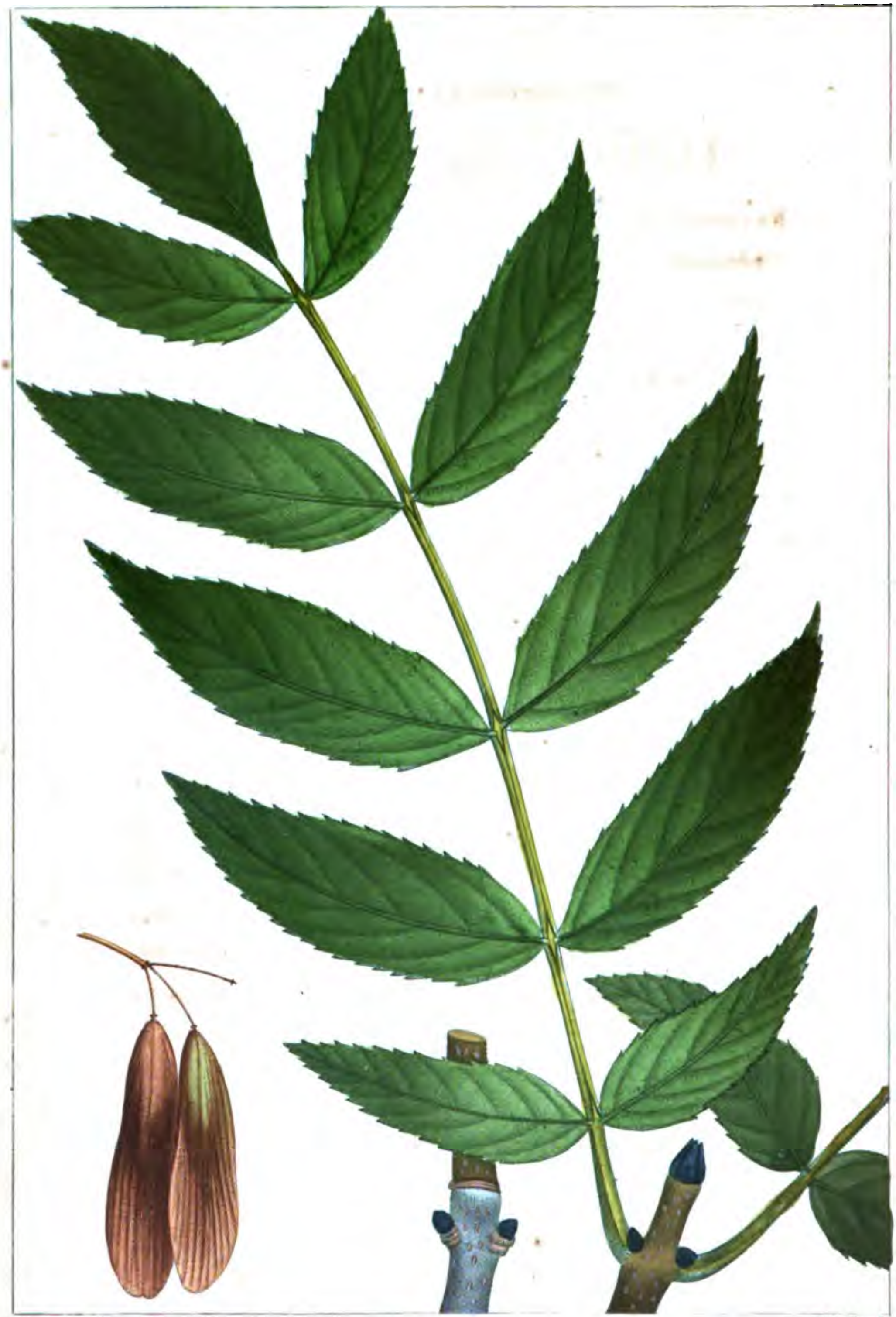
The Green Ash is easily recognized by the brilliant colour of its young shoots and of its leaves, of which the two surfaces are nearly alike. From this uniformity, which is rarely observed in the foliage of trees, Dr. Muhlen berg has given the species the name of *Fraxinus concolor*, and, for the same reason, as it has received no popular specific name, I have called it Green Ash.

The leaves vary in length from 6 to 15 inches, according to the vigour of the tree and to the coolness of the soil, and are composed of 3, 4 or 5 pair of petiolated, oval-acuminate and distinctly denticulated leaflets, surmounted by an odd one. The seeds are only half as large as those of the White Ash, but are similar in form. The wood of the Green Ash is distinguished by the same properties with that of the preceding species; but as the others are common in the same regions, and are so much superior in size it is only accidentally employed.

This species has been multiplied in France from seeds sent home by my father in 1785. It supports the inclemency of our winter, and is esteemed by amateurs for the singular tint of its foliage, which is strikingly contrasted with that of the surrounding trees.

PLATE CXX.

A branch with leaves of half the natural size. Fig. 1, Seeds of the natural size.



Bessa pinx

Gabriel sculp

Common European Ash.

Fraxinus excelsior.

COMMON EUROPEAN ASH.

Fraxinus excelsior. *F. foliis subsessilibus, lanceolato-oblongis, attenuatis, serratis; floribus nudis; seminibus apice emarginatis.*

This Ash is the most common and the most useful species of its genus upon the Old Continent. Like the Common Oak and the White Oak it is found throughout Europe and the North of Asia, and as it is less sensible to cold it would probably be more multiplied than the Oaks if it was not restricted to certain soils. It is found almost exclusively on the borders of rivers and swamps, and in places constantly cool and shaded, without being exposed to inundation; in a word, in situations analogous to those which, in the United States, produce the White Ash and the Red Ash.

The Common Ash is ranked among trees of the first order. It is sometimes 90 feet high and 9 or 10 feet in circumference; but when 60 or 70 feet in height it is in perfection for all the uses to which it is applied. The trunk is straight and well-proportioned; the branches are opposite, covered, while young, with a smooth, greenish bark, and garnished with short, round buds, nearly black like those of the Black Ash. The leaves, which consist of 4 or 5 pair of leaflets with an odd one, are opposite like the branches, of a dark green colour, smooth, acuminate and slightly toothed. The flowers are not conspicuous and are united in bunches : barren, fertile and hermaphrodite flowers are found upon the same tree. The seeds are of a lanceolate oval shape, and terminated by a flat wing which is usually notched at the end : they are ripe towards the beginning of autumn.

In the properties and uses of its wood the European Ash resembles the White Ash of America. In France handsome articles of furniture are made with the pieces immediately below the first ramification, and with the knobs from the trunk of old trees, which exhibit more varied and more agreeable accidents in the direction of the fibres. The Common Ash is subject to be worm-eaten, and is rarely employed in building houses. It burns better than any other wood before it is seasoned, and affords excellent coal.

In the Department of the Cantal, and in some other parts of France, the branches of the Ash are given both dry and green to sheep and cows, without imparting a disagreeable taste to the milk and butter.

Spanish flies are very fond of the leaves of this tree, upon which they sometimes swarm in such numbers as to diffuse an offensive odour.

The ancients, as we are informed by Pliny, believed that serpents had an antipathy to the Ash, and that they never approached it; this prejudice, which is still entertained, has given rise to the belief that a decoction of its roots or leaves in milk is an antidote for the poison of reptiles.

The general utility of its wood causes great attention to be bestowed, in every part of Europe, upon the propagation of the Ash. For this purpose, nurseries are formed from the seed, and the young plants, at the age of 2 or 3 years, are set out wherever the soil is cool and moist enough for their reception : they are capable of succeeding on uplands which are not too dry and sandy, or composed in too great a proportion of clay.

There are several varities of the European Ash, the most remarkable of which is the drooping Ash : its branches decline towards the earth, and the effect is peculiarly picturesque in solitary trees which have been formed by grafting this variety upon the Common Ash.

Many medicinal properties have been ascribed to the Ash, and more accurate observations lead me to believe that if these virtues exist they can reside only in the inner bark, which is bitter and astringent.

The White Ash and the Blue Ash of the United States are superior to the Common European Ash in the very properties for which this species is most esteemed; there is no motive, therefore, for introducing it into the American woods : that it would flourish there is evinced by a beautiful example in the garden of Mr. W. Bartram in the vicinity of Philadelphia.

PLATE CXXI.

A leaf of half the natural size. Fig, 1, Seeds of the natural size.

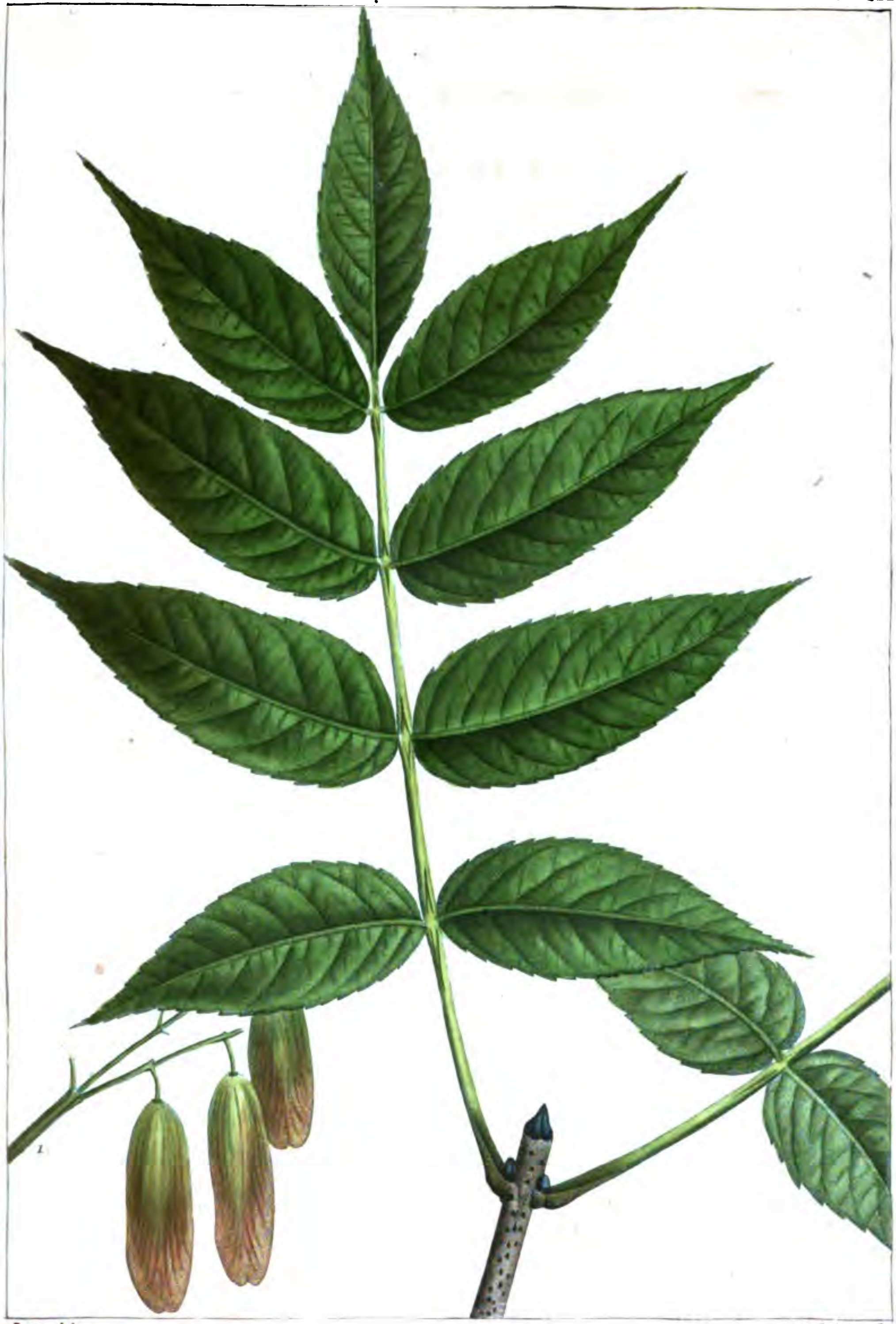
BLACK ASH.

Fraxinus sambucifolia. *F. foliolis sessilibus, acuminatis, serratis; ramis punctatis.*

In the extensive country comprising the Northern Section of the United States and the provinces of New Brunswick and Nova Scotia the White Ash and the Black Ash, which is sometimes called Water Ash, are the most abundant in the forests and the most perfectly known to the inhabitants.

The Black Ash is 60 or 70 feet in height and about 2 feet in diameter. It requires a moister soil exposed to longer inundations than the White Ash, and is usually accompanied by the Red-flowering Maple, the Yellow Birch, the Black Spruce and the Arbor Vitæ; in the Middle States it associates of preference with the Red-flowering Maple and the Red Ash.

The buds of the Black Ash are of a deep blue, and the young shoots of a bright green sprinkled with dots of the same colour which disappear as the season advances. The leaves at their unfolding are accompanied by stipulæ which fall after two or three weeks: they are 12 or 15 inches long when fully developed, and composed of 3 or 4 pairs of leaflets with an odd one. The leaflets are sessile, oval-acuminate, denticulated, of a deep green colour, smooth on the upper surface, and



Bessa del. Gabriel sculp.

Black Ash.

Fraxinus sambucifolia.

coated with red down upon the main ribs beneath: when bruised they emit an odour like that of Elder leaves. The seeds, which are disposed in bunches 4 or 5 inches long, are flat, and, like those of the Blue Ash, are nearly as broad at the base as at the summit.

The Black Ash is easily distinguished from the White Ash by its bark, which is of a duller hue, less deeply furrowed, and has the layers of the epidermis applied in broad sheets. The perfect wood is of a brown complexion and fine texture; it is tougher and more elastic than that of the White Ash, but less durable when exposed to the vicissitudes of dryness and moisture, and for this reason it is less extensively used. Coach-makers do not employ it, and it is never wrought into oars, hand-spikes and pullies. In the District of Maine it is preferred to the White Ash for hoops, which are made of saplings from 6 to 10 feet in length split in the middle. As this wood may be separated into thin, narrow strips, it is selected in the country for chair-bottoms and riddles.

The Black Ash is more liable than any other species to be disfigured with knobs, which are sometimes of considerable size and are detached from the body of the tree to make bowls. The wood of these excrescences has the advantage of superior solidity, and, when carefully polished exhibits singular undulations of the fibre; divided into thin layers it might be employed to embellish mahogany.

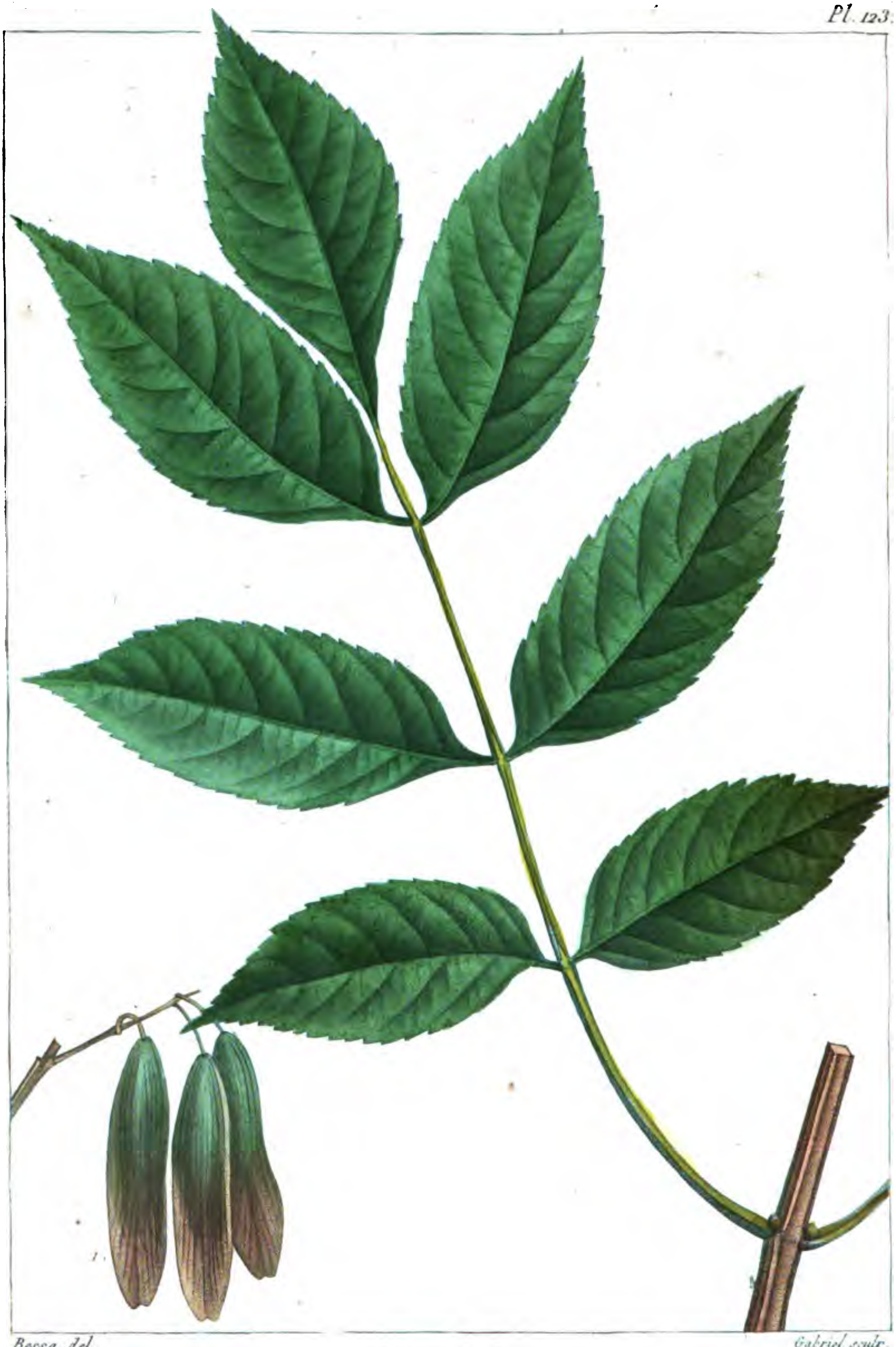
In Vermont and New Hampshire, which furnish great quantities of potash, I have been informed that the ashes of this tree are singularly rich in alkali.

Such are the principal uses of the Black Ash, from which a general idea may be formed of its properties. It deserves a place in the forests of the North of Europe, and by employing its wood we shall learn to estimate its value with greater precision.

Observation. Another lofty species of Ash exists in Kentucky which is also called Black Ash; but I am too imperfectly acquainted with it to attempt a description.

PLATE CXXII.

A branch with leaves of half the natural size. Fig. 1, Seeds of the natural size.



Bessa del. Gabriel sculp.

Blue Ash.

Fraxinus quadrangulata.

BLUE ASH.

Fraxinus quadrangulata. *F. ramulis quadrangulatis, foliolis ad summum 4-jugis, subsessilibus, ovali-lanceolatis, argutè serratis, subtùs pubescentibus, capsulis utrinquè obtusis.*

The Blue Ash is unknown to the Atlantic parts of the United States, and is found only in Tennessee, Kentucky and the Southern part of Ohio. The climate of these countries is mild, and the soil in some places is so fertile that it is difficult, without having witnessed them, to form an idea of the luxuriance of vegetation and the productiveness of agriculture. The richness of the soil proves a substitute for that degree of moisture which, in the Atlantic States, seems indispensable to the Ash. In Kentucky and West Tennessee the forests upon dry and uneven lands, at a distance from the rivers, are composed of the Walnuts, the Red Maple, the Moose Wood, the Hackberry, the American Nettle and the Oaks, several species of which, east of the mountains, grow only in the most humid soils.

The Blue Ash frequently exceeds 60 or 70 feet in height and 18 or 20 inches in diameter. Its leaves are from 12 to 18 inches long, and are composed of 2, 3 or 4 pair of leaflets with an odd one. The leaflets are large, smooth, oval-acuminate, distinctly toothed and sup-

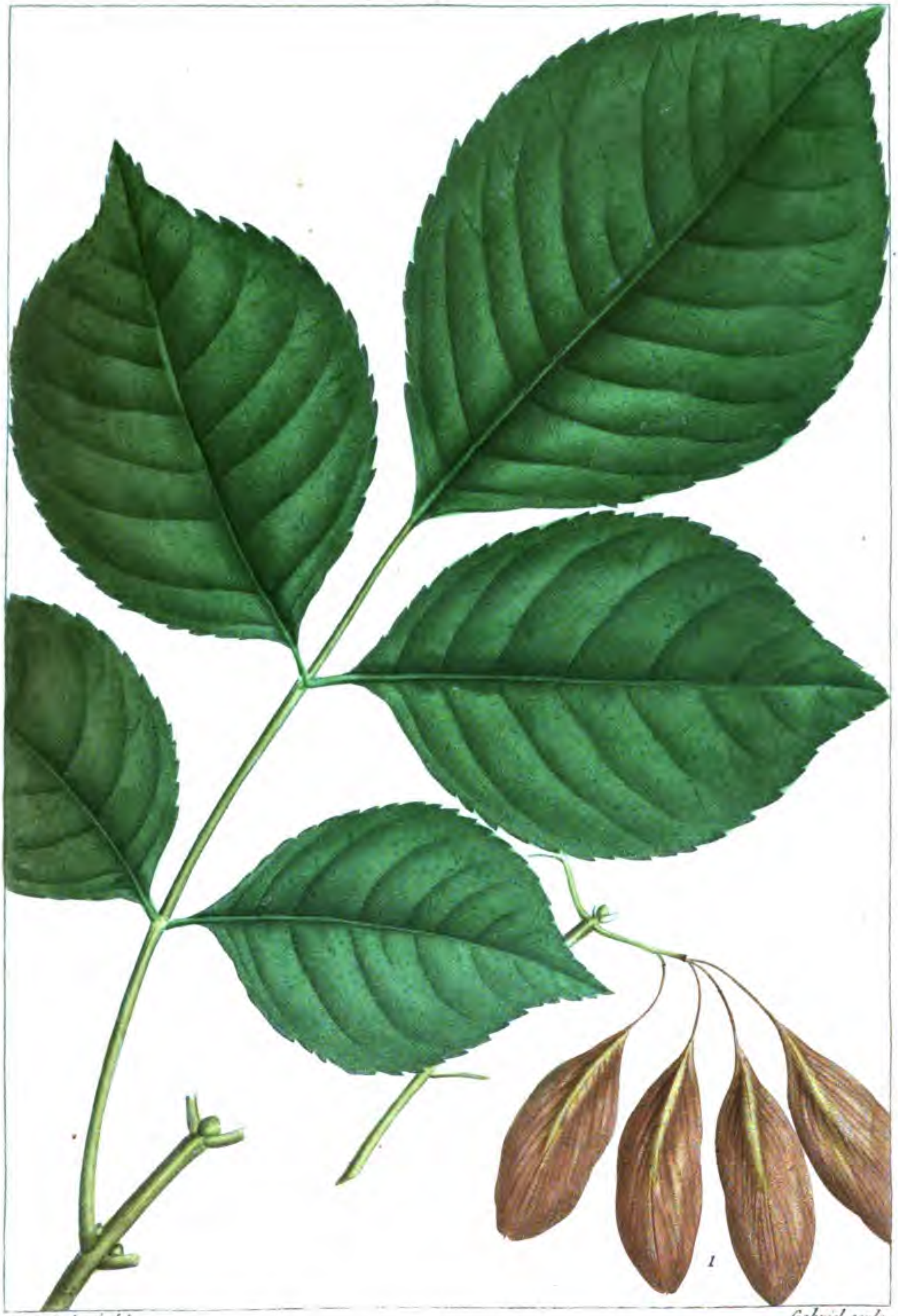
CAROLINIAN ASH.

Fraxinus platicarpa. *F. foliolis petiolatis, ovalibus, serratis; capsulis lato lanceolatis.*

This species of Ash, which is very distinctly characterised by the form of its leaves and seeds, is confined to the Southern States. It abounds particularly on the river Cape Fear in North Carolina, and upon the Ashley and the Cooper in South Carolina. As it has received no specific name from the inhabitants, I have given it that of Carolinian Ash.

The marshy borders of creeks and rivers, and all places exposed to long inundations, are congenial to this Ash, which delights in more abundant moisture than the other species. Its vegetation is beautiful, but its stature rarely exceeds 30 feet, and it fructifies at half this height. In the spring the lower side of the leaves and young shoots is covered with thick down, which disappears at the approach of summer. The leaves commonly consist of two pair of leaflets with a terminal odd one. The leaflets are large, nearly round, petiolated and distinctly toothed. The flowers, as in the other species, are small and not very conspicuous; the seeds, unlike those of any Ash with which we are acquainted, are flat, oval, and broader than they are long.

From its inferior dimensions the Carolinian Ash is



H. J. Redouté del.

Gabriel sculp.

Carolinian Ash.

Fraxinus platicarpa.

totally neglected; but accurate experiments on the nature of different species of wood in America will perhaps evince that this tree, as well as others that are regarded as worthless, possesses properties of eminent utility.

PLATE CXXIV.

A branch of half the natural size. Fig. 1, *Seeds of the natural size.*

BLACK WILLOW.

Amentaceæ. Juss.

Salix nigra. *S. foliis lanceolatis, acuminatis, serratis, glabris; petiolis pubescentibus.*

This species is the most common of the American Willows, and the most analogous to that of Europe. It is less multiplied in the Northern and Southern than in the Middle and especially in the Western States. It is found on the banks of the great rivers, such as the Susquehannah and the Ohio, and is called Black Willow, or simply Willow.

The Black Willow is rarely more than 30 or 35 feet high and 12 or 15 inches in diameter. It divides at a small height into several divergent but not pendant limbs, and forms a spacious summit. The leaves are long, narrow, finely denticulated, of a light green, and destitute of stipulæ. In the uniformity of its colouring the foliage of this species differs from that of the European Willow, the lower surface of which is glaucous.

Upon the trunk the bark is greyish and finely chapt; upon the roots it is of a dark brown, whence may have been derived the specific name of the tree. The roots afford an intensely bitter decoction, which is considered in the country as a purifier of the blood, and as a preventive and a remedy for intermittent fevers.

The wood is white and soft, and the branches are easily broken from the tree. Neither the wood nor the twigs are applied to any useful purpose.

PLATE CXXV.

Fig. 1, *Leaves of the natural size.*

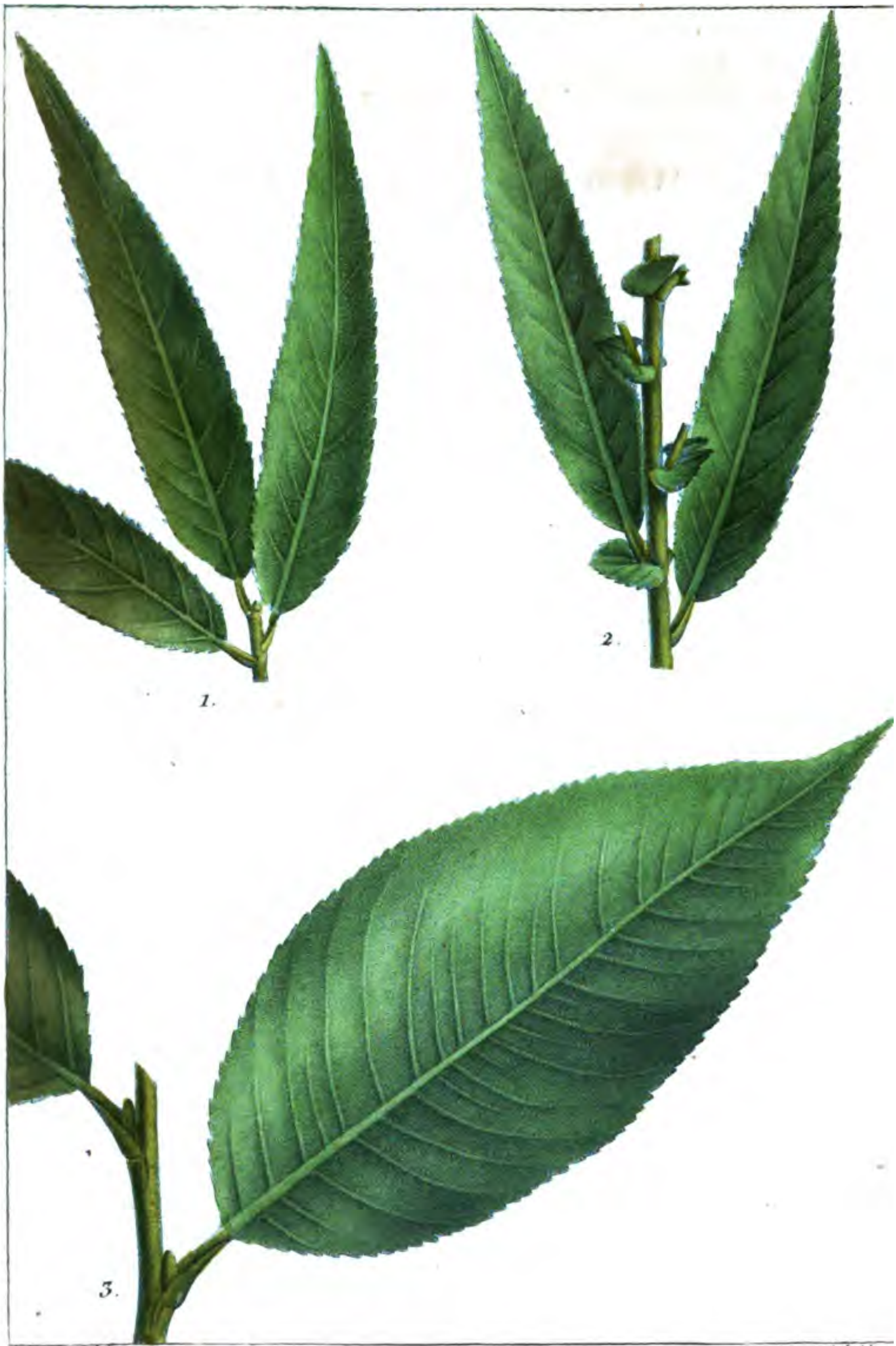
CHAMPLAIN WILLOW.

Salix ligustrina. *S. foliis lanceolato-linearibus, acuminatis, serratis; stipulis inæqualiter cordatis; petiolis villosis.*

I have found this Willow on the shores of Lake Champlain, particularly near the village of Skeensborough. It is about 25 feet high and 7 or 8 inches in diameter: its first aspect resembles that of the Black Willow, but its leaves are longer, narrower, and accompanied at the base by cordiform, serrate stipulæ. Its wood and branches are appropriated to no use.

PLATE CXXV.

Fig. 2, Leaves of the natural size.



A. Redoute del. Gabriel sc.

1. Black Willow. 2. Champlain Willow.
Salix nigra. *Salix ligustrina.*
3. Shining Willow.
Salix lucida.

SHINING WILLOW.

Salix lucida. *S. foliis oblongis, cuspidato-acuminatis, nitidis; argutè serratis; serraturis glandulosis.*

I have observed the Shining Willow, which is so called by some persons on account of the brilliancy of its foliage, only in the Northern and Middle States. It is found in moist but open grounds, and is more common on the edges of the salt meadows than in the interior of the forests; it is also seen on the islands, not covered with woods, in the rivers and near the shores of the lakes.

This species is easily distinguished by the superior size of its leaves, which are oval-acuminate, denticulated, and sometimes 4 inches in length.

The Shining Willow attains the height of 18 or 20 feet; but its ordinary elevation is 9 or 10 feet. Baskets are made of its branches, when those of the European Willow, which are preferable, cannot be obtained; but it possesses no property that recommends it to attention.

Observation. Many species of Willow are found in the United States and in Canada, the greater part of which are susceptible of no useful employment. The three species which I have described are distinguished only by their superior height; but even these are greatly inferior to the European Willow in size and in the properties of their wood. In the Northern and Middle States, particularly in Pennsylvania and in some townships in the lower part of New Jersey, great numbers of the European Willow have been planted, of which light baskets are fabricated for the market of Philadelphia. This tree furnishes the charcoal for the manufacture of gunpowder.

PLATE CXXV.

Fig. 3, *A leaf of the natural size.*

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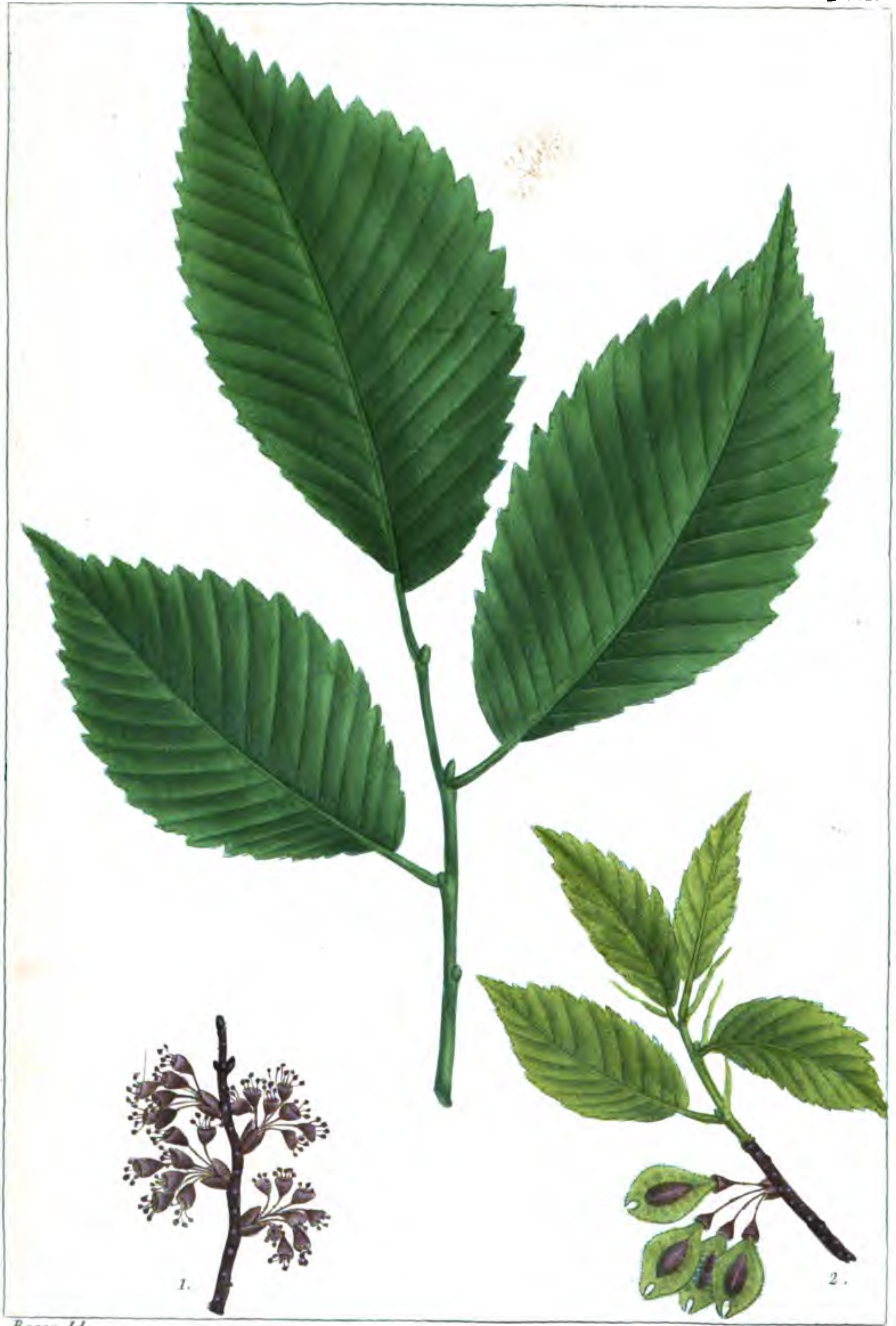


Bessa del.

Gabriel Sc.

White Elm.

Ulmus Americana

WHITE ELM.

Pentendria digynia. Linn. Amentaceæ. Juss.

Ulmus americana. *U. ramis lævibus, pendulis; foliis subuniformiter serratis; floribus manifestè pedicellatis; fructibus densissimo fimbriatis.*

This tree, which is known throughout the United States by the name of White Elm, is found over an extensive tract of the North-American Continent. Towards the North, my father indicates its first appearance in about the latitude of 48° 20′, 18 miles from the mouth of the river Mistassin, which empties into lake St. John in Canada. I have myself observed it from Nova Scotia to the extremity of Georgia, a distance of 1200 miles. It abounds in all the Western States, and I have learned that it is common in the neighbourhood of the great rivers that water Upper Louisiana and discharge themselves into the Mississippi. But it appeared to be the most multiplied and of the loftiest height between the 42nd and 46th degrees of latitude, which comprise the provinces of Lower Canada, New Brunswick and Nova Scotia, the North-Eastern *Section* of the United States, and Gennessee in the State of New York.

The leaves of the White Elm are 4 or 5 inches long, borne by short petioles, alternate, unequal at the base, oval-acuminate and doubly denticulated. They are gene rally smaller than those of the Red Elm, of a thinner texture and a smoother surface, with more regular and prominent ribs.

This species differs, also, essentially from the Red Elm and the European Elm in its flowers and seeds: the flowers appear before the leaves, and are very small, of a purple colour, supported by short, slender footstalks, and united in bunches at the extremity of the branches. The seeds are contained in a flat, oval, fringed capsule, notched at the base: the season of their maturity is from the 15th of May to the first of June.

The White Elm delights in low, humid, substantial soils, such as in the Northern States are called *interval lands*. In the Middle States it grows in similar situations, and on the borders of swamps, where it is usually accompanied by the White Oak, the Sweet Gum, the Tupelo, the Red Maple and the Shag-bark Hickory. West of the mountains it abounds in all the fertile bottoms watered by the great rivers that swell the Ohio and the Mississippi; I have constantly observed it on their brink with the White Maple and the Buttonwood, where its base is inundated at the rising of the waters in the spring. On the banks of these rivers it is sometimes 4 feet in diameter. In the Middle States it stretches to a great height, but does not approach the magnificence of vegetation which it displays in the countries peculiarly adapted to its growth. In clearing the primitive forests a few stocks are sometimes left standing; insulated in this manner it appears in all its majesty, towering to the height of 80 or 100 feet, with a trunk 4 or 5 feet in diameter, regularly shaped, naked, and insensibly diminishing to the height of 60 or 70 feet, where it divides itself into two or three primary limbs. The limbs, not widely divergent near the base, approach and cross each other 8 or 10 feet higher, and diffuse on all sides long, flexible, pendulous branches, bending into regular arches and floating lightly in the air. A singularity is observed in this tree which I have witnessed in no other; two small limbs 4 or 5 feet long grow in a reversed position near the first ramification, and descend along the trunk.

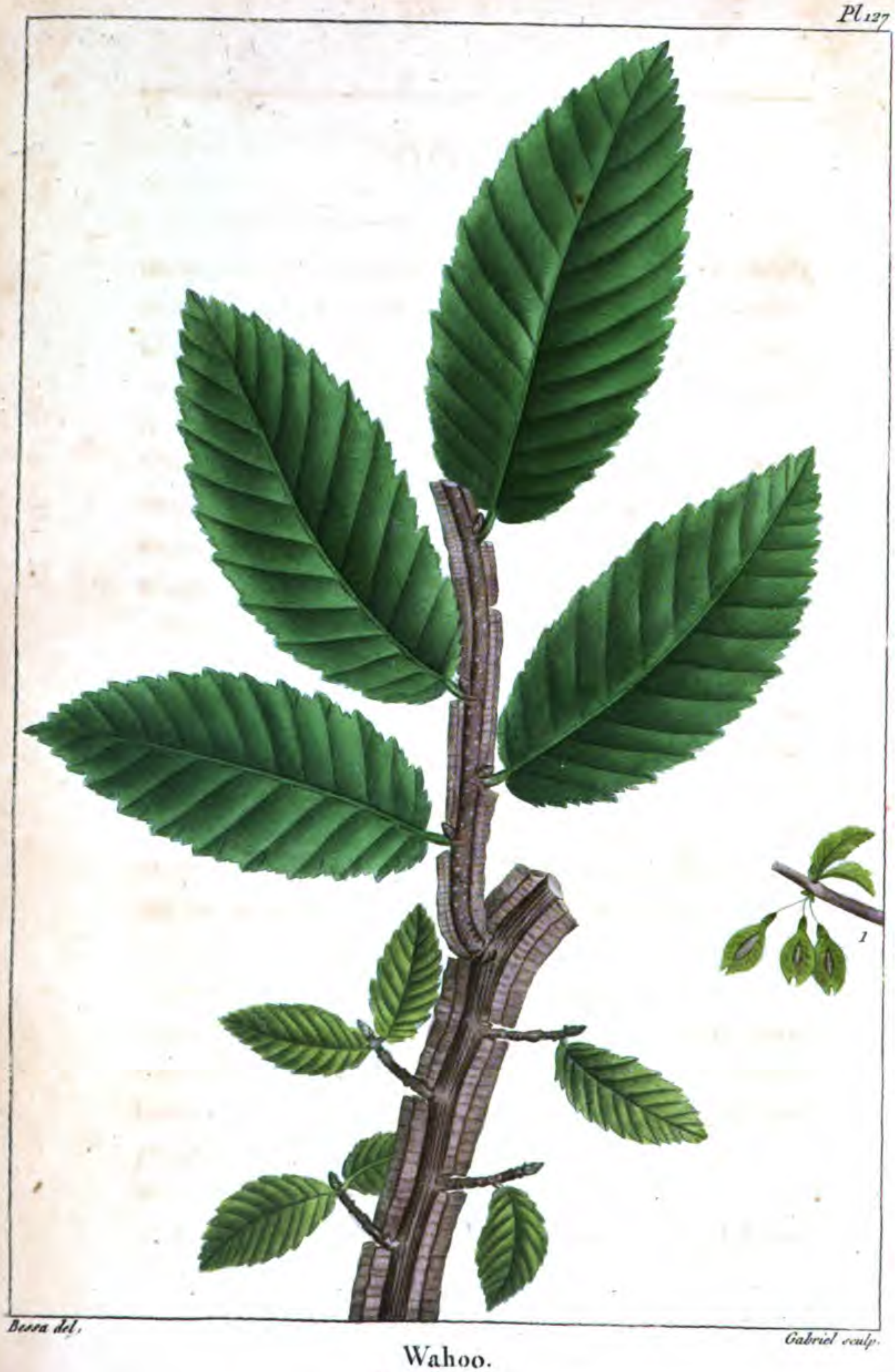
The Buttonwood astonishes the eye by the size of its trunk and the amplitude of its head; but the White Elm has a more majestic appearance, which is owing to its great elevation, to the disposition of its principal limbs, and to the extreme elegance of its summit. In New Hampshire, between Portsmouth and Portland, a great number of young White Elms are seen detached in the middle of the pastures; they ramify at the height of 8, 10 or 12 feet, and their limbs springing at the same point cross each other and rise with an uniform inclination, so as to form of the summit a sheaf of regular proportions and admirable beauty.

The trunk of this Elm is covered with a white, tender bark very deeply furrowed. The wood, like that of the Common European Elm, is of a dark brown, and, cut transversely or obliquely to the longitudinal fibres, it exhibits the same numerous and fine undulations; but it splits more easily, and has less compactness, hardness and strength. This opinion was given me by several English wheel-wrights established in the United States, and I have since proved its correctness by a comparison of the two species. The White Elm is used, however, at New York and farther north for the naves of coach-wheels, because it is difficult to procure the Black Gum, which at Philadelphia is preferred for this purpose. It is not admitted into the construction of houses or of vessels, except occasionally in the District of Maine for keels, for which it is adapted only by its size. Its bark is said to be easily detached during eight months of the year; soaked in water and suppled by pounding, it is used in the Northern States for the bottoms of common chairs.

Such are the few and unimportant uses of the White Elm in the United States; it is far inferior to the European Elm, which is a tree of very extensive utility, and it deserves attention in the Old World only as the most magnificent vegetable of the temperate zone.

PLATE CXXVI.

A branch with leaves of the natural size. Fig. 1, Flowers. Fig. 2, Seeds.



Bessa del.

Gabriel sculp.

Wahoo.

Ulmus Alata.

WAHOO.

Ulmus pumila. WALTER.

ULMUS ALATA. *U. ramis passim ex utroque latere in alam suberosam corticalem dilatatis; foliis oblongo-ovalibus, sensim acutis, basi subæqualibus; fructu pubescente et confertius cilioso.*

THE Wahoo is a stranger to the Northern and Middle States, and to the mountainous regions of the Alleghanies; it is found only in the lower part of Virginia, in the maritime districts of the Carolinas and Georgia, in West Tennessee and in some parts of Kentucky. Probably it grows also in the two Floridas and in Lower Louisiana, of which the soil and climate are analogous to those of the maritime parts of the Southern States, and of which the vegetable productions, with some exceptions, are the same.

The name of Wahoo, given to this species of Elm in South Carolina and Georgia, is derived from the Indians; but I am ignorant of its meaning.

The Wahoo grows of preference on the banks of rivers and in the great swamps enclosed in the pine-barrens: it has always appeared to me to be less multiplied than the trees by which it is accompanied. It is of a middling stature, commonly not exceeding 30 feet, with a diameter of 9 or 10 inches; the two largest stocks that I have seen were at Wilmington, N. C.: they were perhaps 40 or 45 feet high, 15 inches in diameter, and seemingly very old.

The flowers, like those of other Elms, open before the leaves. The seeds are fringed and differ from those of the White Elm only by a little inferiority of size. The leaves are borne by short petioles, and are oval, denticulated, and smaller than those of the White and Red Elms.

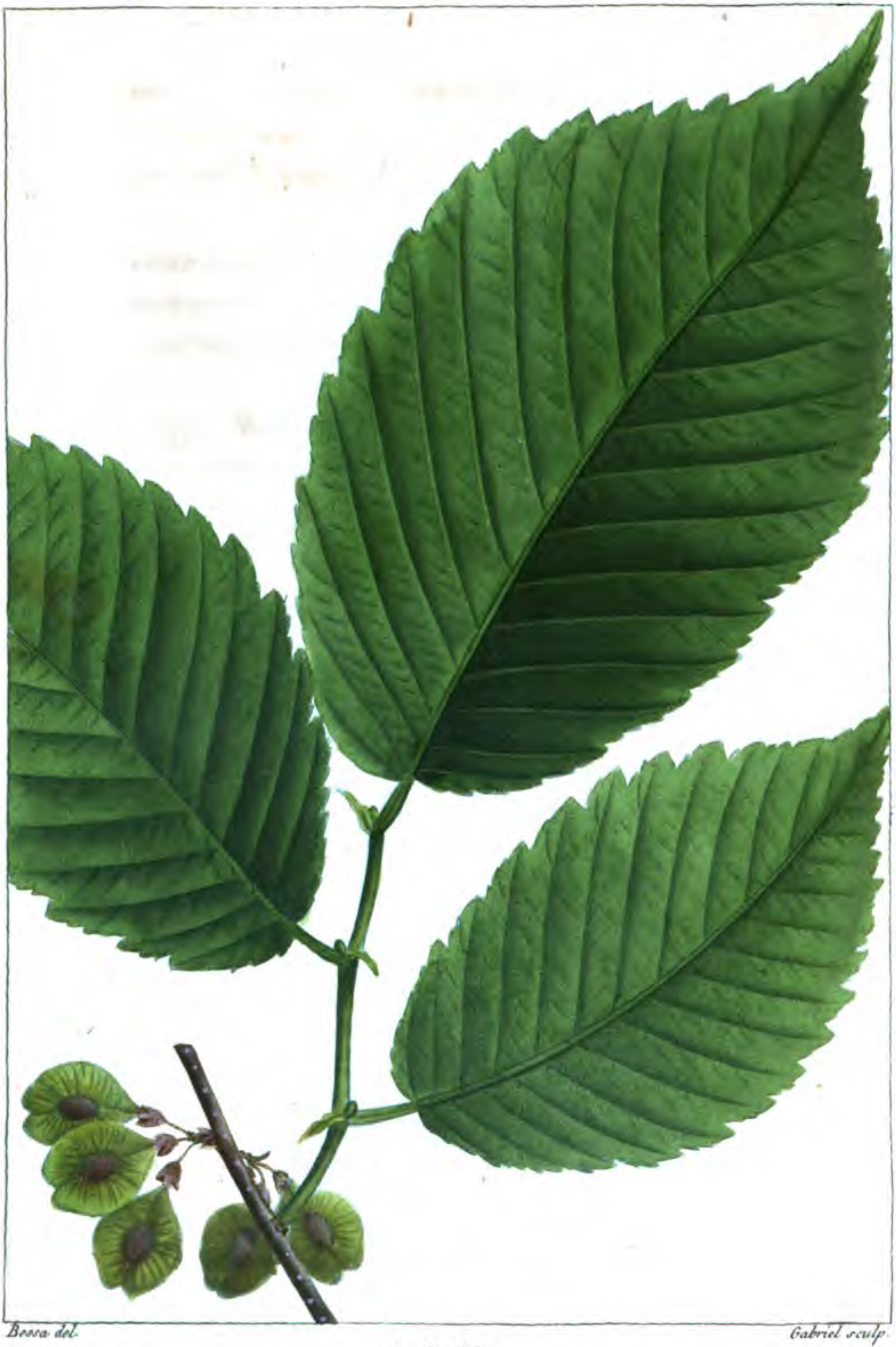
The branches are furnished throughout their whole length, on two opposite sides, with a fungous appendage, 2 or 3 lines wide, from which the name of *alata*, winged, has been given to the species.

The wood of the Wahoo is fine-grained, more compact, heavier, and, I believe, stronger than that of the White Elm. The heart is of a dull red approaching to chocolate-colour, and always bears a large proportion to the sap. At Charleston, S. C., and in some other towns of the Southern States, it is employed for the naves of coach-wheels, and is even preferred, for this object, to the Tupelo, as being harder and tougher; but it is appropriated to no other use.

For economical purposes this species is uninteresting to the Europeans, as the Common Elm is greatly superior in size and in the quality of its wood: these advantages should engage the Americans to introduce the European species into their forests.

PLATE CXXVII.

A branch with leaves of the natural size. Fig. 1, *Seeds of the natural size.*



Bessa del. Gabriel sculp.

Red Elm.

Ulmus Rubra.

RED ELM.

Ulmus rubra: *U. foliis plerumquè ovalibus oblongis, rarius cordato-ovalibus, utrinque rugosis; gemmis sub explicatione densâ fulvâque lanâ tomentosis; floribus sessilibus.*

Except the maritime districts of the Carolinas and Georgia, this species of Elm is found in all parts of the United States and of Canada. It bears the names of Red Elm, Slippery Elm and Moose Elm, of which the first is the most common: the French of Canada and Upper Louisiana call it *Orme gras.*

The Red Elm, though not rare, is less common than the Oaks, the Maples, the Sweet Gum and the Sassafras; it is also less multiplied than the White Elm, and the two species are rarely found together, as the Red Elm requires a substantial soil free from moisture, and even delights in elevated and open situations, such as the steep banks of rivers, particularly of the Hudson and the Susquehannah. In Ohio, Kentucky and Tennessee it is more multiplied than east of the mountains, and with the Hickories, the Wild Cherry Tree, the Red Mulberry, the Sweet Locust, the Coffee Tree and some other species, it constitutes the growth upon the richest lands of an uneven surface.

This tree is 50 or 60 feet high and 15 or 20 inches in diameter. In the winter it is distinguished from the

White Elm by its buds, which are larger and rounder; and which, a fortnight before their developement, are covered with a russet down.

The flowers are aggregated at the extremity of the young shoots. The scales which surround the bunches of flowers are downy like the buds. The flowers and seeds differ from those of the preceding species; the calyx is downy and sessile, and the stamina are short and of a pale rose colour; the seeds are larger, destitute of fringe, round, and very similar to those of the European Elm; they are ripe towards the end of May. The leaves are oval-acuminate, doubly denticulated, and larger, thicker and rougher than those of the White Elm.

The bark upon the trunk is brown; the heart is coarser-grained and less compact than that of the White Elm, and of a dull red tinge. I have remarked that the wood, even in branches of 1 or 2 inches in diameter, consists principally of perfect wood. This species is stronger, more durable when exposed to the weather, and of a better quality than the White Elm; hence in the Western States it is employed with greater advantage in the construction of houses, and sometimes of vessels on the banks of the Ohio. It is the best wood of the United States for blocks, and its scarceness in the Atlantic States is the only cause of its limited consumption in the ports. It makes excellent rails, which are of long duration and are formed with little labour, as the trunk divides itself easily and regularly: this is probably the reason that it is never employed for the naves of wheels.

The Red Elm bears a strong likeness to a species or a variety in Europe known by the name of Dutch Elm. The leaves and the bark of the branches, macerated in water, yield, like those of the Dutch Elm, a thick and abundant mucelage, which is used for a refreshing drink in colds, and for emollient plasters in place of the marsh mallow root, which does not grow in the United States.

Though the Red Elm is superior to the White Elm, it is not equal to our European species, and its culture cannot be generally recommended.

Observation. In the District of Maine and on the banks of Lake Champlain I have found another Elm which I judged to be a distinct species. Its leaves were oval-acuminate, rough and deeply toothed, but I have not seen its flowers or its seeds. The length of its young shoots announced a vigorous vegetation. It is confounded in use with the White Elm, to which it is perhaps superior; it is found in the nurseries of France, and, probably, it came originally from Canada.

PLATE CXXVIII.

A branch with leaves and seeds of the natural size.

COMMON EUROPEAN ELM.

Ulmus campestris. *U. foliis duplicato-serratis, basi inæqualibus; floribus subsessilibus, conglomeratis, pentandris; fructibus glabris.*

Upon the Old Continent one of the most useful trees in the mechanical arts is the Elm, which is indigenous to the centre of Europe and to the north of Asia. It was formerly most abundant in Germany, and the town of Ulm in Suabia is said to derive its name from the vast forests of Elm that existed in its vicinity.

This tree was cultivated by the Ancients, and highly esteemed for the excellence of its wood: it is frequently mentioned by Virgil, Pliny and Theophrastus.

No forests consisting wholly of Elm are found in England, Germany, France or Italy; but the habitual use and superior fitness of its wood for certain valuable purposes, cause it to be propagated on private estates, by the sides of high-ways, and in the large forests which in different countries are kept on foot by the governments. Thus cultivated and artificially multiplied it has produced numerous varieties, like the fruit trees, which are distinguished principally by their foliage: in some of them the leaves are small, shining and coriaceous; in others, large, downy and supple. To this difference must be added that of the bark: upon a trunk 6 inches in diameter, in some varieties, the bark is smooth; in others it is rough and scaly upon saplings less than two inches thick. Distinctions are also founded upon the rapidity of vegetation and the quality of the wood. Nursery-men assure us that new varieties are constantly appearing among the young plants reared from the seed; hence it becomes impossible to compose invariable definitions, or to harmonize the confusion of botanical writers.

But all these varieties may be referred to two types, in which remarkable differences are found and constantly reproduced. One of these is the Common Elm, under which are ranged all the ordinary varieties; the other is the Large-leaved or Dutch Elm.

The Common Elm is one of the tallest and finest trees of the temperate zone of Europe; several stocks yet survive in France which were planted in the reign of Henry IV, about the year 1580, by the orders of Sully, and which are 25 or 30 feet in circumference and 80 or 90 feet high.

The leaves of the Common Elm are oblong, pointed, doubly serrate and unequal at the base. The flowers appear in the beginning of March, about three weeks before the leaves; they are small, reddish, not conspicuous, and are united in clusters on the shoots of the preceding year; they are succeeded by oval, bordered capsules, containing a single flat, roundish seed, which varies in size in different varieties, and is ripe towards the end of April.

The wood of the Elm has less strength than the Oak, and less elasticity than the Ash; but it is tougher and less liable to split. In France it is usually employed for mounting artillery, and for this purpose it is selected with the greatest care. The trees are cut according to the use to which they are destined, and the pieces are stored under shelter to dry during six or seven years; the precaution is even observed of turning them every six months, that the seasoning may proceed more uniformly. Thus perfected the wood is used for the carriages of cannon, and for the gunwhale, the blocks, etc., of ships. It is every where preferred by wheel-wrights for the naves and felloes of wheels and for other objects.

The quality of this wood depends in a singular degree on the situation in which it grows: high ground and a strong soil are necessary to its perfection; and when planted in such a soil on the side of roads or on the ramparts of fortified towns, where it is vext by the winds and exposed to all the influences of the seasons, it is still firmer and more solid.

The knobs which grow upon old trunks are divided into thin plates by cabinet-makers, and when polished they exhibit very diversified accidents in the arrangement of the fibre, and form beautiful articles of furniture.

Well-cords are made of the bark of the Elm; the wood is an excellent combustible, and in some countries the leaves are given for food to sheep and larger cattle.

In fertile and humid soils the Elm is subject to a species of ulceration which appears on the body of the tree at the height of 3 or 4 feet, and which discharges a great quantity of sap. The disease penetrates gradually into the interior of the tree and corrupts its substance. Many attempts have been made to cure it in the beginning or to arrest its progress, but hitherto without success: the best treatment is to pierce the tree to the depth of 2 or 3 inches with an auger, in the very heart of the malady, which is declared by the flowing of the sap.

The English writers on forest trees, Evelyn, Miller, Marshall, etc., mention twenty varieties of the Elm, seven of which are particularly remarkable and may serve as types of the rest; these are the true English Elm, the narrow-leaved Cornish Elm, the Dutch Elm, the black Worcestershire Elm, the narrow-leaved Witch Elm, the broad-leaved Witch Elm, and the upright Witch Elm. On the Continent we possess these principal varieties and those that are referred to them; but we consider the Dutch Elm as a distinct species, not derived, like the others, from the Common Elm.

In England the true English Elm is recognized as the best wood; and to avoid mistake, in forming plantations, grafted stocks are procured from the nurseries;

for neither the foliage nor the wood offers any peculiar appearance by which it may be certainly distinguished.

In the description of the Tupelo particular mention has been made of a precious variety of the Common Elm, the *Twisted Elm*, omitted by the German and English writers, which is propagated in the Departments about Paris, in that of the North, and in Belgium.

It is an object of importance to multiply this invaluable variety, which can be done only by grafting or by transplanting suckers. It is reared with the greatest care at Meaux and Meudes, a few leagues from Paris, and thence it is procured with the greatest certainty.

The Curled Maples, till they are 7 or 8 inches in diameter, exhibit no undulations of the fibre, and a similar fact is observed in the Twisted Elm; the fibres do not assume the spiral direction till the trunk is 9 or 10 inches thick. In comparing attentively young Twisted Elms less than 8 inches in diameter with other varieties planted at the same time in the same soil, the only difference I observed was that the vegetation of the Twisted Elm was more vigorous, its foliage of a lighter green, and its bark perfectly smooth, while that of the other stocks, even when only 2 inches in diameter, was thick and chapt.

In France, Belgium, and some parts of Germany, many of the high-ways, as well as the public walks in the neighbourhood of large towns, are planted with the Elm, which, besides the value of its wood, has a tufted foliage, and suffers the pruning-hook without injury. The trees destined for this purpose are reared in nurseries, and when about 2 inches in diameter are set out, in the autumn, at the distance of 24 feet. During the first years the ground is kept loose, that the rain may penetrate more easily to their roots.

The seeds are sown soon after they are gathered, in a loose and kindly soil; a part of them come up the same year, and a part the following spring. The second year the young stocks are transplanted to another spot, well tilled like the first, and placed at the distance of 18 inches. To produce a straight and regular trunk they should be annually pruned. The sixth year they may be removed and permanently fixed.

PLATE CXXIX.

Plate 1, *Leaves of the natural size. Fig.* 1, *Flowers of the natural size. Fig.* 2, *Seeds of the natural size.*

DUTCH ELM.

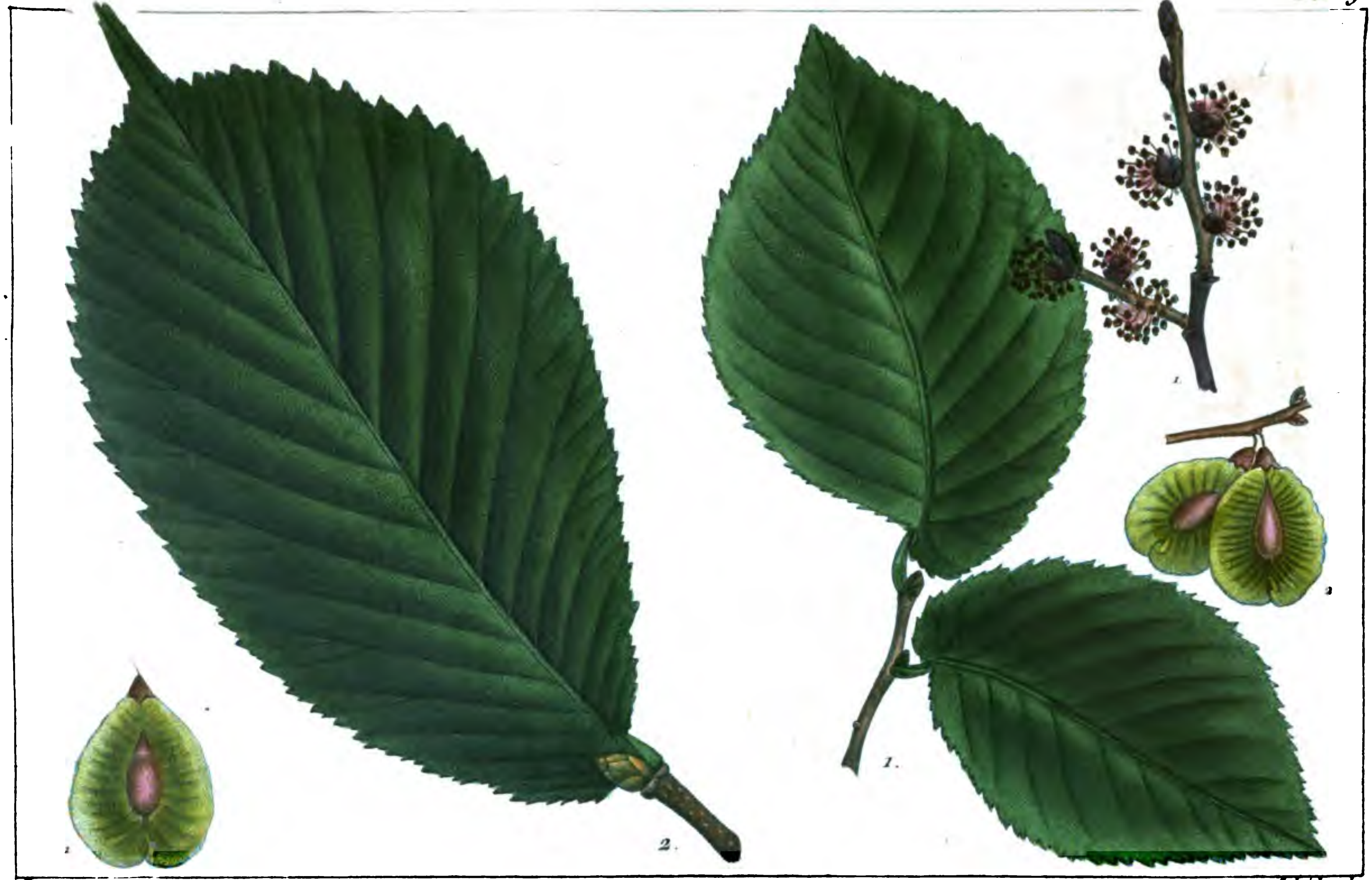
Ulmus suberosa. *U. foliis duplicato-serratis, rugosis; floribus subsessilibus, conglomeratis, tetrandris; fructibus glabris; cortice ramulorum suberoso-alato.*

This species is easily distinguished from the Common European Elm by its leaves, which are larger, thicker, rugged on both surfaces, and borne by short petioles. The flowers, also, are of a lighter tint and the seeds are larger. In the winter, when stript of its foliage, the Dutch Elm is recognized by its round buds, and by the thickness of its shoots of the preceding year.

The bark of its young branches, as in the Red Elm, is full of mucilage, which, 30 years ago, was celebrated in cutaneous affections. It was preserved and given in decoction, in doses of 2 ounces, steeped in a quart of river water reduced by boiling to a pint. This practice was long prevalent; but, notwithstanding some authentic attestations of its success, it has fallen into disuse.

The Dutch Elm so nearly resembles the Red Elm of the United States in its flowers, foliage and fruit, that it is not always easy to distinguish them: the most striking difference is in the buds; those of the Red Elm are covered in the spring with a thick, reddish down; those of the Red Elm, on the contrary, are smooth, or, at

Pl. 129.



Bessa pinx.

Gabriel sculp.

2. Dutch Elm.
Ulmus latifolia.

1. Common European Elm.
Ulmus campestris.

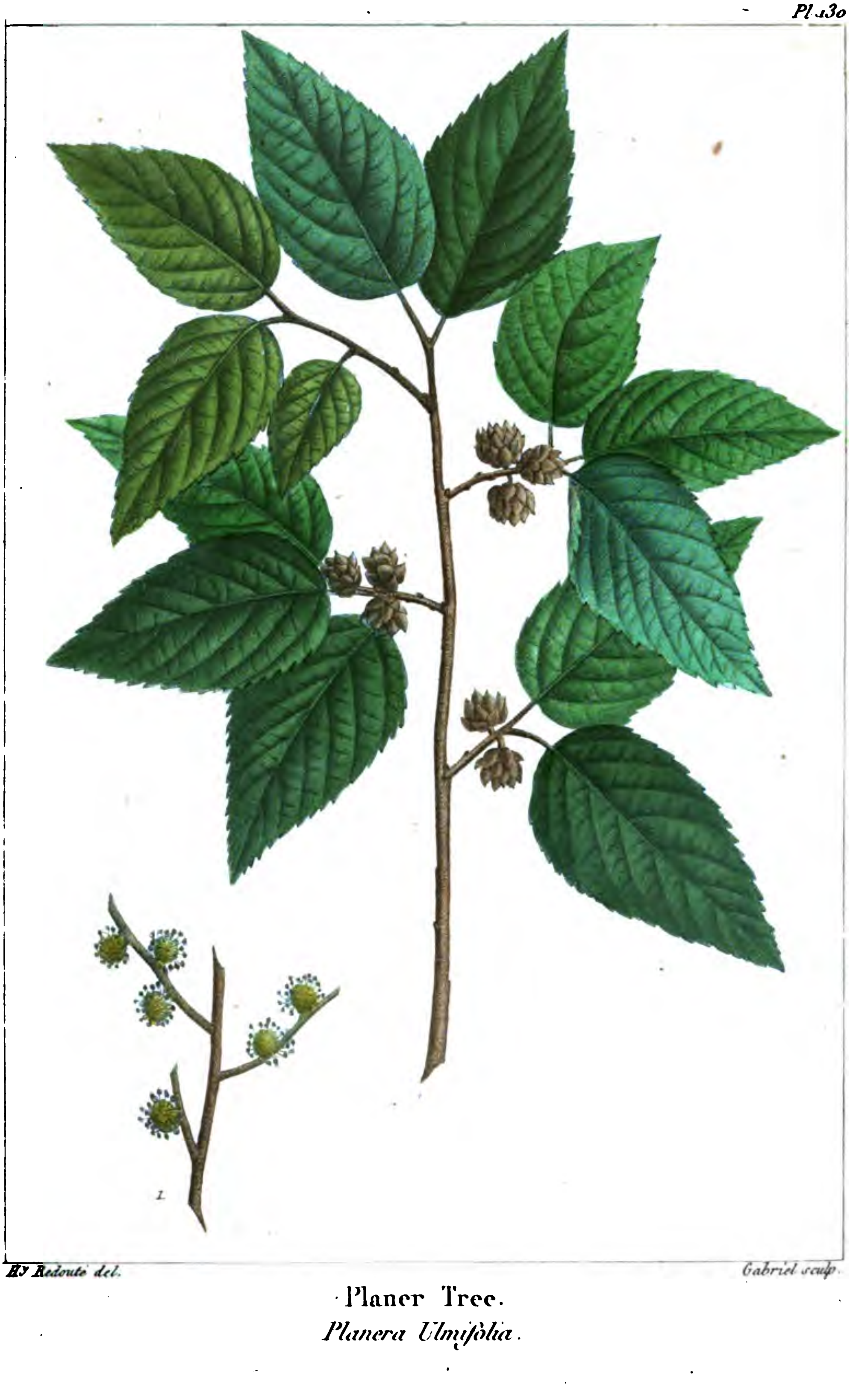
PLANER TREE.

Planera ulmifolia. *P. foliis petiolatis, oblongo-ovalibus, sensim angustatis, acutis, basi obtusis, æqualiter serratis; capsulâ scabrâ.*

Kentucky, Tennessee, the banks of the Mississippi and the Southern States are the only parts of the American Republic where my father and myself have found the Planer Tree. Its wood is not used, and probably for this reason the tree has attracted no attention from the inhabitants, and has received no distinctive denomination; to supply the deficiency, I have adopted the botanical name.

I have more particularly observed the Planer Tree in the large swamps on the borders of the river Savannah in Georgia. It is a tree of the second order, and is rarely more than 35 or 40 feet high and 12 or 15 inches in diameter. Its bloom is early and not conspicuous. Its minute seeds are contained in small, oval, inflated, uneven capsules. The leaves are about an inch and a half long, oval-acuminate, denticulated, of a lively green and a little like those of the European Elm, to which this species bears the greatest analogy.

The wood of the Planer Tree is hard, strong, and seemingly proper for various uses; it is probably similar



Hʸ Redouté del.

Gabriel sculp.

Planer Tree.

Planera Ulmifolia.

in its characters to the analogous species in the north of Asia, the *Siberian Elm*; but, as I have already remarked, the tree is rare and the wood is neglected.

PLATE CXXX.

A branch with leaves and seeds. Fig. 1, *A small shoot with male flowers.*

AMERICAN LIME, OR BASS WOOD.

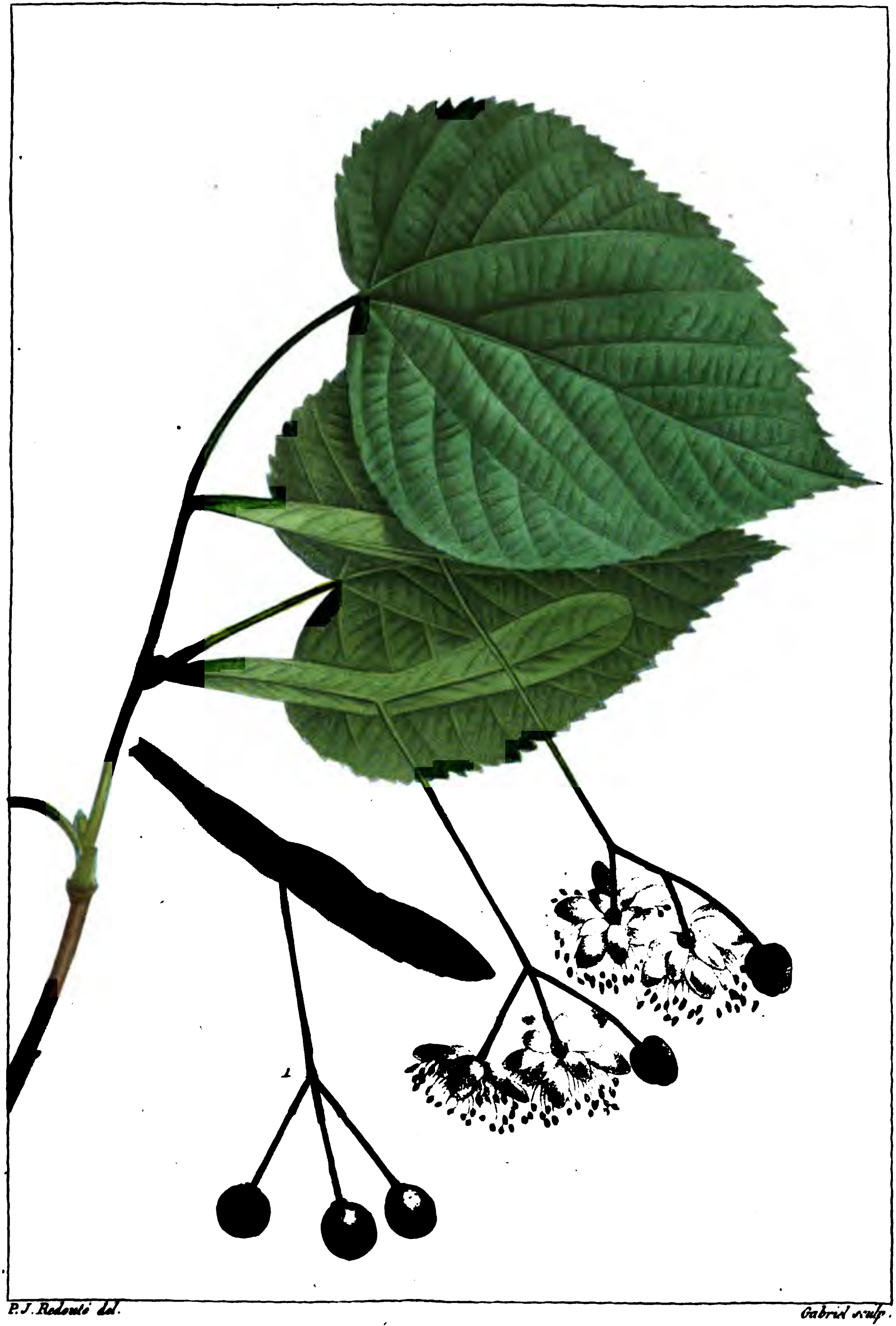
Polyandria monogynia. LINN. Tiliaceæ. JUSS.

TILIA AMERICANA. *T. foliis suborbiculato-cordatis, abruptè acuminatis, argutè serratis, glabris; petalis apice truncatis; nuce ovatâ.*

AMONG the Lime Trees of North America east of the Mississippi, this species is the most multiplied. It exists in Canada, but is more common in the northern parts of the United States, where it is usually called Bass Wood; it becomes less frequent towards the South, and in Virginia, the Carolinas and Georgia, it is found only on the Alleghany Mountains.

I have found this species of Lime Tree most abundant in Gennessee, which borders on lake Erie and lake Ontario. In some districts, particularly between Batavia and New Amsterdam, it frequently constitutes two thirds, and sometimes the whole, of the forests. The Sugar Maple, the White Elm and the White Oak are the trees with which it most frequently associates.

In newly cleared lands the remains of the Lime Trees are distinguished by the numerous sprouts which cover the stumps and the large roots, whose growth can be prevented only by stripping off the bark or by the operation of fire. The stumps of other large trees, the



P. J. Redouté del.

Gabriel sculp.

Bass Wood

Tilia Americana.

Elm, the Sugar Maple and the Ash, left at the same height of 3 feet, do not produce shoots.

The presence of the Lime Tree indicates a loose, deep and fertile soil. It is sometimes more than 80 feet high and 4 feet in diameter, and its straight, uniform trunk, crowned with an ample and tufted summit, forms a beautiful tree. The leaves are alternate, large, nearly round, finely denticulated, heart-shaped at the base, and abruptly terminated in a point at the summit. The flowers are borne by long peduncles, pendulous, subdivided at the extremity, and garnished with a long, narrow, floral leaf. The seeds, which are ripe about the first of October, are round and of a grey colour. The flowers of the American Lime Tree are probably endowed with the same antispasmodic and cephalic properties which are ascribed to those of the European species.

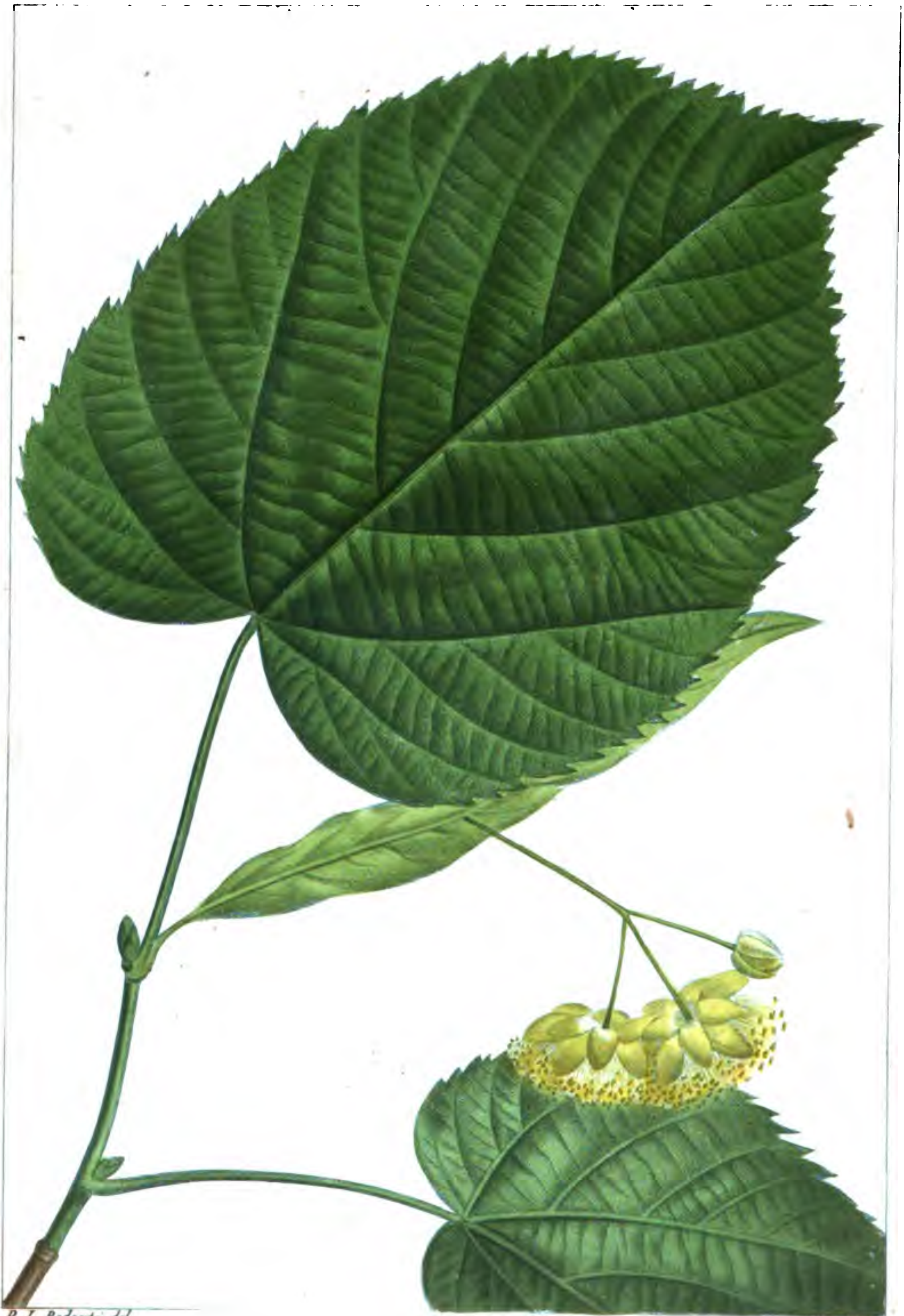
The trunk is covered with a very thick bark; the cellular integument, separated from the epidermis and macerated in water, is formed into ropes, which are used only in the country; in Europe they are sold for certain purposes in the cities, particularly for well-cords.

The wood is white and tender: in the Northern States, where the Tulip Tree does not grow, it is used for the pannels of carriage-bodies and the seats of windsor-chairs; but as it is softer and splits more easily, it is less proper for these objects; it is in Boston and the more northern towns that I have observed the Lime Tree beginning to be substituted for the Tulip Tree. On the Ohio the images affixed to the prow of vessels are made of this wood instead of the White Pine.

The American Lime Tree has long been cultivated in Europe, and it is distinguished from our native species by the superior size of its leaves.

PLATE CXXXI.

A branch with leaves diminished one half, and with flowers of the natural size.



P. J. Redouté del.

Gabriel sculp.

White Lime.

Tilia Alba.

WHITE LIME.

TILIA ALBA. *T. foliis majoribus, ovatis, argutè serratis; basi obliquè aut æqualiter truncatis; subtùs incanis.*

I HAVE not met with the White Lime Tree east of the river Delaware, but it is abundant in Pennsylvania, Maryland, Delaware and the Western States. It does not grow, like the preceding species, in elevated places nor amidst other trees in the forests, and is rarely seen except on the banks of rivers; I have particularly observed it on those of the Susquehannah, the Ohio, and the streams which empty into them.

The height of the White Lime Tree rarely exceeds 40 feet, and its diameter 12 or 18 inches. Its young branches are covered with a smooth, silver-grey bark, by which it is recognized in the winter. The leaves are very large, denticulated, obliquely heart-shaped and pointed, of a dark green on the upper surface and white beneath, with small reddish tufts on the angles of the principal nerves. This whitish tint is most striking on solitary trees exposed to the sun.

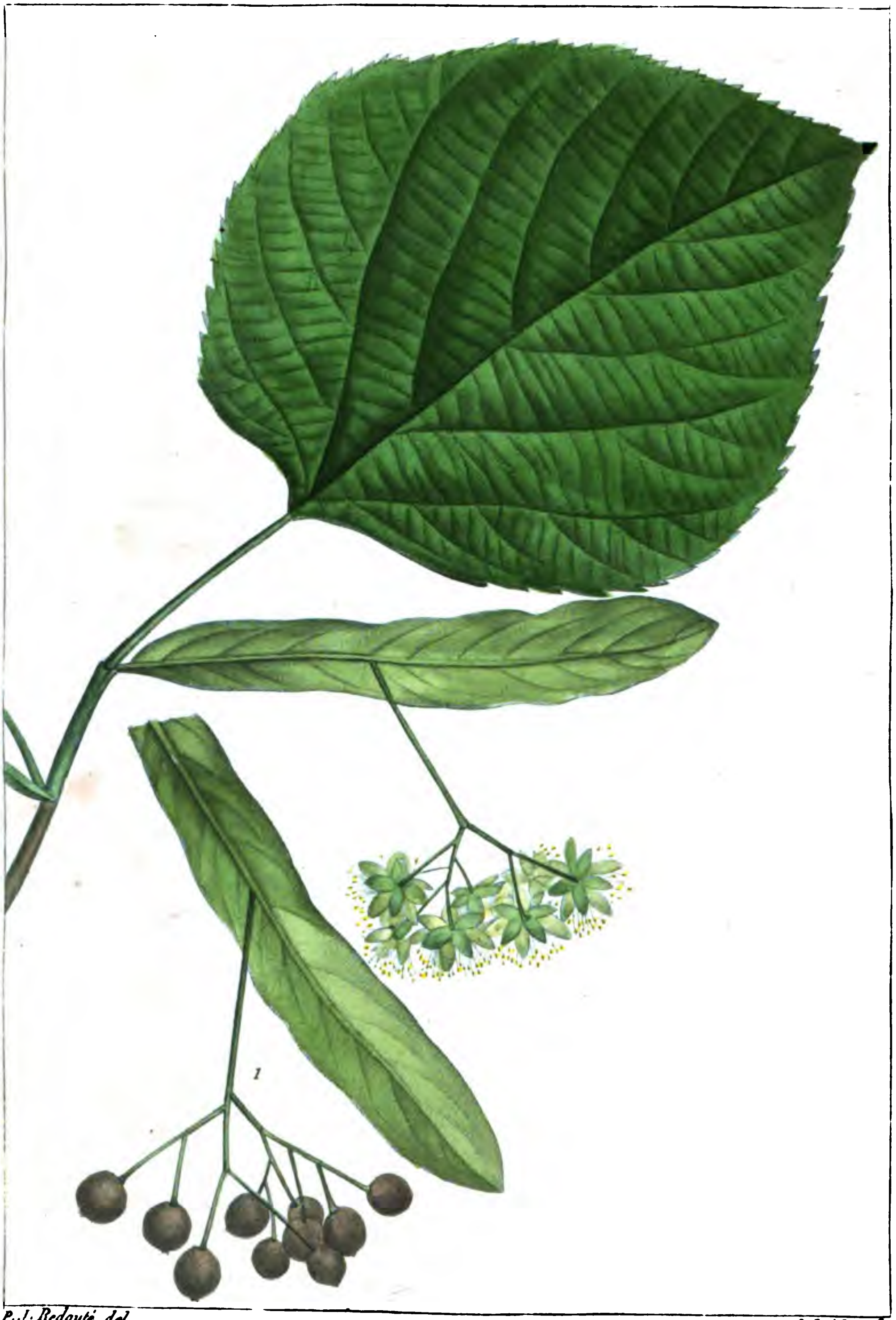
The flowers come out in June, and, as well as the floral leaf, are larger than those of any other Lime Tree with which I am acquainted. The petals are larger and whiter, and are impregnated with an agreeable odour. The seeds are round, or rather oval, and downy.

The wood of this tree is white and tender, and I believe it is never employed in the arts.

This and the following species have received no popular specific names, but are both called Lime Tree and Bass Wood: that of White Lime, which I have given to the subject of the present article on account of the colour of its foliage, is peculiarly appropriate.

PLATE CXXXII.

A branch with leaves and flowers of the natural size. Fig. 1, *Seeds.*



P. J. Redouté del.

Gabriel sculp.

Downy lime Tree.

Tilia pubescens.

DOWNY LIME TREE.

Tilia pubescens. *T. foliis basi truncatis, obliquis, denticulato-serratis, subtus pubescentibus; petalis emarginatis, nuce globosâ.*

The Downy Lime Tree belongs to the southern parts of the United States and to the Floridas. It grows of preference on the borders of rivers and large marshes, where the soil is cool and fertile, but not exposed to inundation. It is little multiplied, and consequently is not taken notice of by the inhabitants; for this reason, and because it is the only species of its kind in the maritime parts of the Carolinas and of Georgia, it has received no specific denomination, and is called simply Lime Tree, to which I have added the epithet *downy,* derived from a character of its foliage not observed in the preceding species.

This tree is 40 or 50 feet in height with a proportional diameter. In its general appearance it resembles the American Lime Tree, which grows farther north, more than the White Lime Tree, which belongs to the Middle and Western States. Its leaves differ widely in size according to the exposure in which they have grown; in dry and open places they are only 2 inches in diameter, and are twice as large in cool and shaded situations. They are rounded, pointed at the summit, very obliquely truncated at the base, edged with fewer and more remote teeth than those of the other Lime Trees, and very downy beneath. The flowers, also, are more numerous and form larger bunches, and the seeds are round and downy.

The wood is very similar to that of the other species, and I do not know that it is ever employed.

This tree was introduced long since into France; its vegetation is vigorous and is uninjured by the severest winters of Paris, which leads me to believe that it exists in upper Louisiana and in the Western States.

PLATE CXXXIII.

A branch with leaves and fruit of the natural size.

PINES.

THE Pines are evergreen trees, and are usually of elevated stature. They form a most interesting genus, and are highly valuable for the resinous matter which they afford, as well as for the excellent properties of their wood. The most striking difference between the Pine and the Spruce is in the arrangement of their foliage: the leaves of the Pines, which resemble pieces of coarse thread, vary in length in different species, and are united to the number of two, three or five in the same sheath; those of the Spruces, on the contrary, are only a few lines long, and are attached singly round the circumference of the branch or upon its opposite sides.

To facilitate the distinction of these trees, of which the species are more numerous in the United States than in Europe, I have grouped the Pines according to the roughness of their cones and to the number of leaves united in the same sheath, and the Spruces according to the disposition of their foliage.

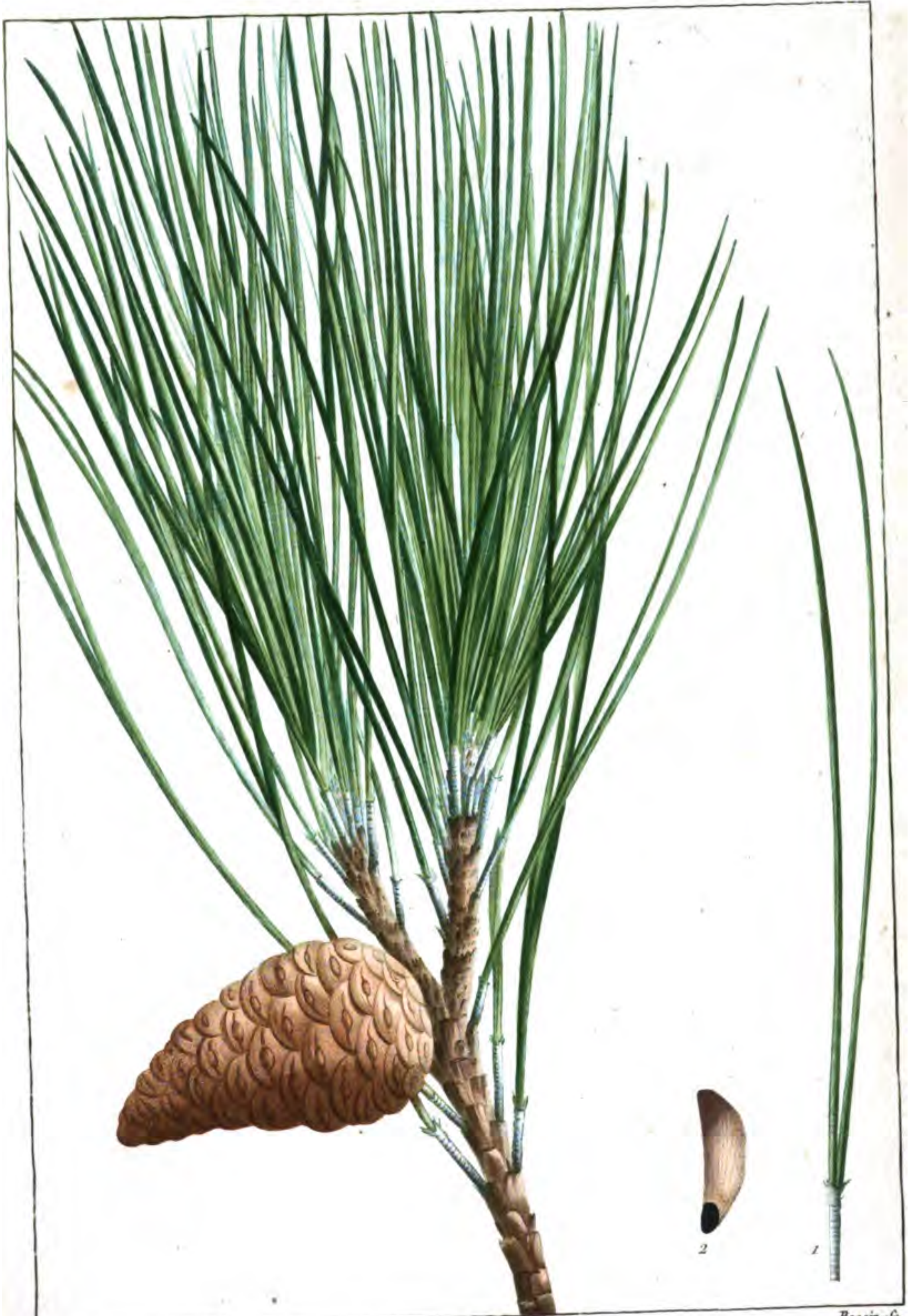
RED PINE, OR NORWAY PINE.

PINUS RUBRA. *P. arbor maxima; cortice rubente; foliis binis 4-5 uncialibus; strobilis ovato-conicis, basi rotundatis, folio demidio-brevioribus, squamis medio dilatatis, inermibus.*

Pinus resinosa, Ait. *Hort. Kew.*

THIS tree is called by the French inhabitants of Canada *Pin rouge*, Red Pine, and the name has been preserved by the English colonists. In the northern parts of the United States it is called Norway Pine, though differing totally from that tree, which is a species of Spruce. The first of these denominations should be adopted by the Americans, especially as it is founded on a distinguishing character of the species, which will be taken notice of in its place.

In a journey made by my father in 1792 to Hudson's Bay, for the purpose of remarking as he returned the points at which the vegetables of this northern region appear and disappear, he first observed the Red Pine near Lake St. John in Canada, in the 48th degree of latitude. Towards the South I have not seen it beyond Wilkesborough in Pennsylvania, in latitude 41° 30'; and it is rare in all the country south of the river Hudson. It is found in Nova Scotia, where it bears the same name



P. J. Redouté del.

Bessin Sc.

Red Pine.

Pinus rubra.

as in Canada, and also that of Yellow Pine. Mackenzie, in the narrative of his journey to the Pacific Ocean, mentions it as existing beyond Lake Superior.

But the Red Pine does not, like the Black Spruce, the Hemlock Spruce and the White Pine, constitute a large proportion of the extensive forests which cover these regions, but occupies small tracts of a few hundred acres, alone or mingled only with the White Pine. Like most species of this genus, it grows in dry and sandy soils, by which the luxuriance of its vegetation is not checked, for it is 70 or 80 feet in height and 2 feet in diameter. It is chiefly remarkable for the uniform size of its trunk for two thirds of its length.

The bark upon the body of this tree is of a clearer red than upon that of any other species in the United States; hence is derived its popular name, and hence I have substituted the specific epithet *rubra* for that of *resinosa*, employed by Aiton, and adopted by Sir A. B. Lambert. Another motive for the change was to prevent a mistake to which many persons would be liable, of supposing that this species affords the resinous matter so extensively used in ship-building.

The leaves are of a dark green, 5 or 6 inches long, united in pairs and collected in bunches at the extremity of the branches, like those of the Long-leaved Pine and Maritime Pine, *Pinus maritima,* instead of being dispersed like those of the Jersey and Wild Pines. The female flowers are bluish during the first months after their appearance, and the cones, which are destitute of thorns and which shed their seeds the first year, are about 2 inches long, rounded at the base and abruptly pointed.

The concentrical circles are crowded in the Red Pine, and the wood, when wrought, exhibits a fine compact grain. It is rendered heavy by the resinous matter with which it is impregnated, and in Canada, Nova Scotia and the District of Maine, it is highly esteemed for strength and durability, and is frequently employed in naval architecture, especially for the deck of vessels, for which it furnishes planks 40 feet long without knots. Stript of the sap it makes very lasting pumps. The main-mast of the St. Lawrence, a ship of fifty guns built by the French at Quebec, was of this Pine, which confirms my observation concerning its stature.

The Red Pine is exported to England in planks from the District of Maine and the shores of Lake Champlain: I have lately learned that this commerce is diminished, because the timber is said to consist in too great a proportion of sap: but the objection appears to me unfounded; several trunks a foot in diameter, that I have examined, contained only one inch of sap.

While young, the Red Pine has a beautiful aspect, and its vegetation is always vigorous; it would doubtless succeed in France and throughout the north of Europe, and the useful properties of its wood and the resinous matter that might be extracted from it are sufficient inducements to its cultivation. I by no means agree with Sir A. B. Lambert, that its wood is always of an inferior quality.

PLATE CXXXIV.

A branch with a cone of the natural size. Fig. 1, *A leaf. Fig.* 2, *A seed.*

STONE PINE.

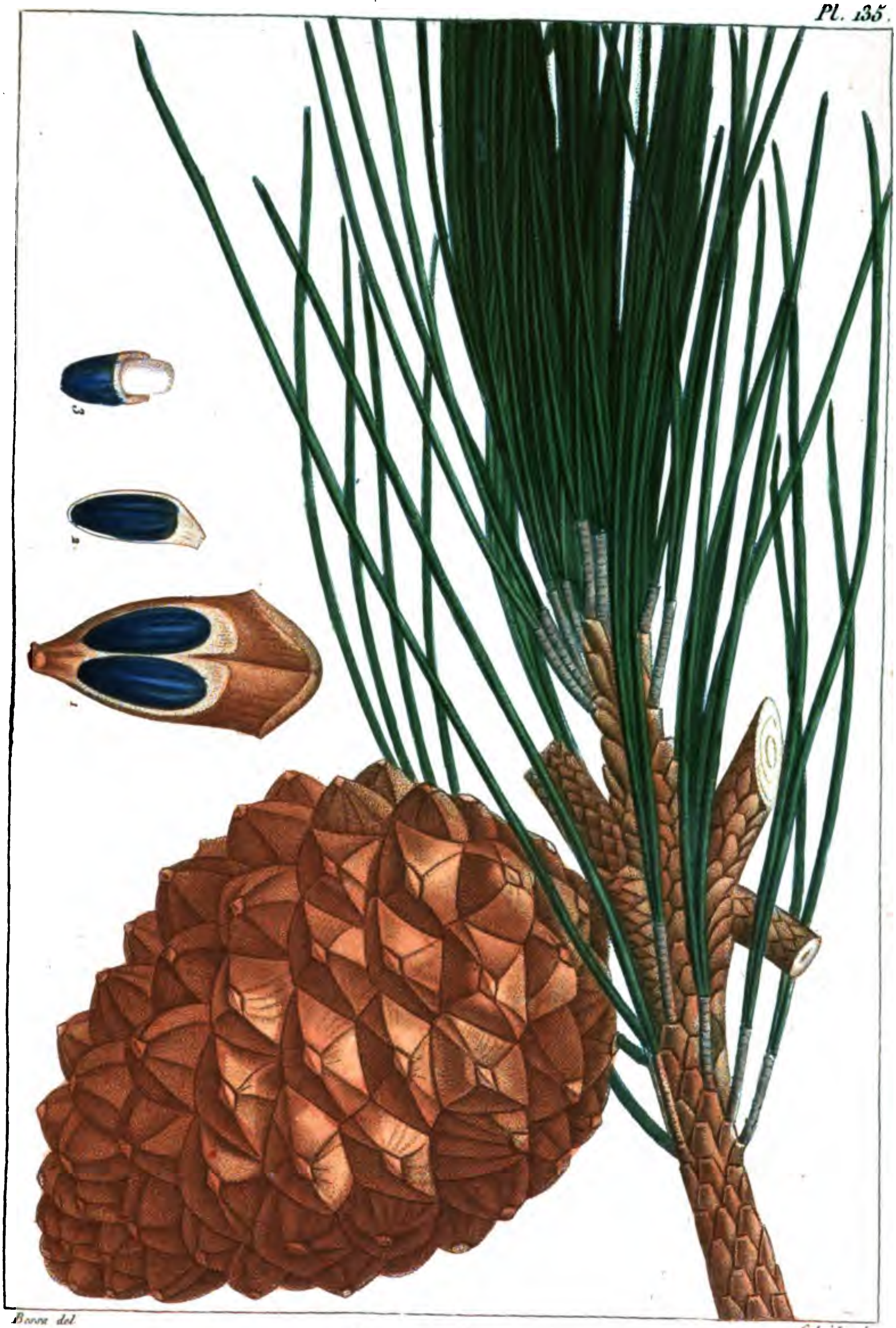
Pinus pinea. *P. foliis geminis; strobilis ovatis, obtusis, subinermibus; foliis longioribus; nucibus duris.*

The Isles of the Mediterranean Sea, the shores of European Turkey, and the South of Europe in general produce this species of Pine. It grows with difficulty in more northern climates, and requires to be protected from the cold while young; in this manner have been reared the stocks that exist in the botanical garden of Paris, which support a winter as rigorous as that of Richmond in Virginia.

The Stone Pine attains the height of 55 or 60 feet, with a diameter of 15 or 20 inches, and is easily distinguished by its wide and depressed summit. The leaves are about 5 inches in length, united in pairs, and of a bright green. The cones are 5 inches long, 4 inches broad, and very obtuse. On the inner side of each scale, at the base, are two pits containing a hard seed of a deep blue colour surmounted by a short wing. The seeds enclose a white kernel, of an agreeable taste when fresh, which is served upon the table: but there is a Pine known in Portugal by the name of *Pinhao molar,* and in Naples by that of *Piniolo molese,* of which the kernel is tender and in every respect preferable.

The Stone Pine is a conquest of civilised man from

Pl. 135.



Bessa del. Gabriel sculp.

Pinus Pinea.

Stone pine.

savage Nature, and a long course of uninterrupted cultivation has been necessary to perfect its fruit. To assign the period at which this process was begun is perhaps impossible; it must, however, be remote, for these cones are found, as an architectural ornament, in the Greek and Roman antiquities.

Though this tree can be of little value to the United States, it deserved to be mentioned, as it grows in the poorest soils, has a picturesque appearance, and is associated with recollections that are cherished by every lover of the Arts and Sciences.

PLATE CXXXV.

A branch with a cone of the natural size. Fig. 1, A leaf. Fig. 2, A seed.

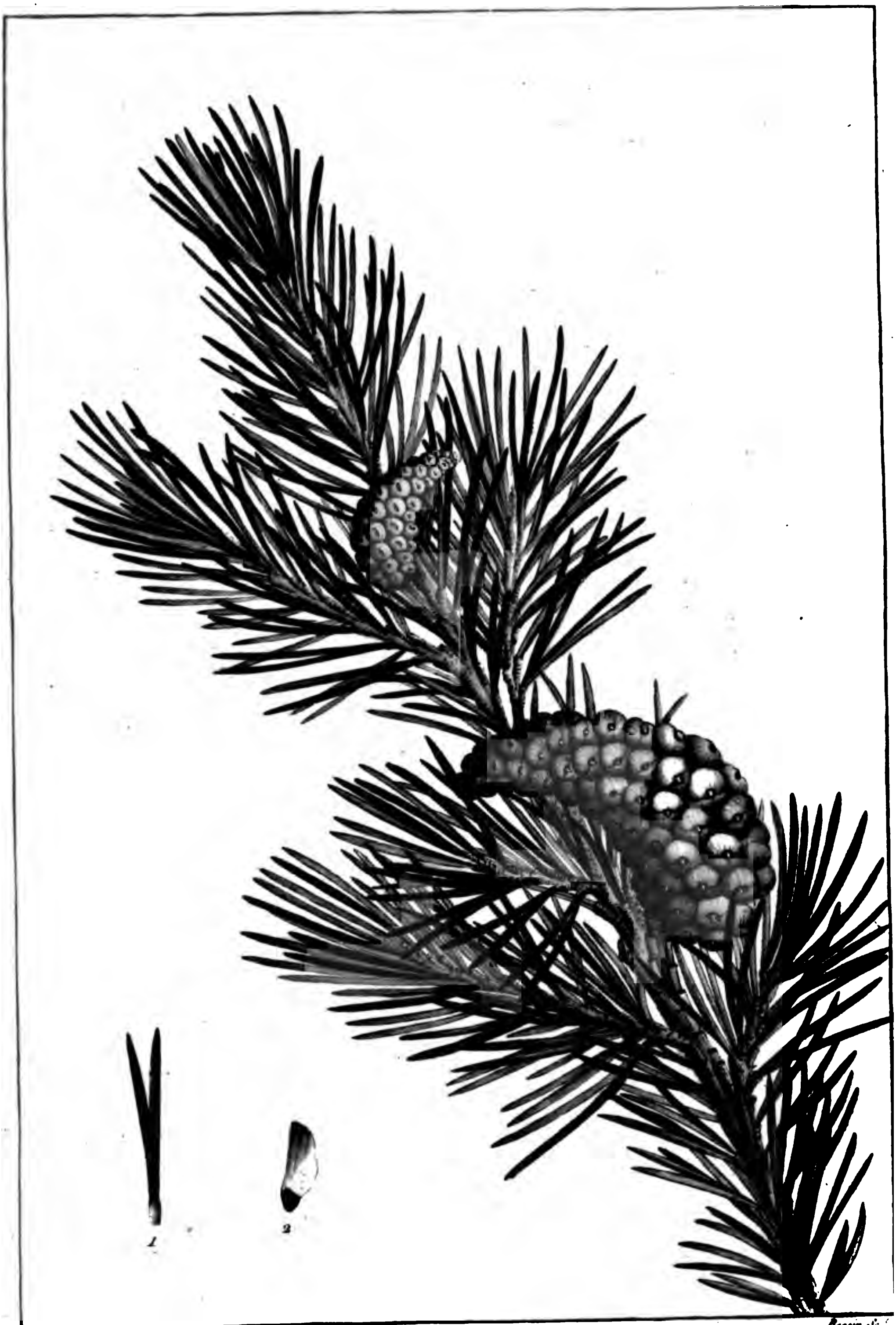
GREY PINE.

Pinus rupestris. *P. arbor humilis; foliis binis, rigidis, uncialibus; strobilis cinereis, recurvis, insigniter incurvato-tortis; squamis inermibus, ramulo adpressis.*

Pinus Banksiana. Lambert.

This species is found farther northward than any other American Pine. In Nova Scotia and the District of Maine, where it is rare, it is called *Scrub Pine*, and in Canada, *Grey Pine.* I cannot impart a juster idea of its nature than by an extract from my father's notes upon Canada : " In the environs of Hudson's Bay and of the Great Mistassin lakes, the trees which compose the forests a few degrees farther south disappear almost entirely, in consequence of the severity of the winter and the sterility of the soil. The face of the country is almost every where broken by innumerable lakes, and covered with large rocks piled upon each other and usually overgrown with large black lichens, which deepen the gloomy aspect of these desolate and almost uninhabited regions. Here and there, in the intervals of the rocks, are seen a few individuals of this species of Pine, which fructify and even exhibit the appearances of decrepitude at the height of 3 feet. One hundred and fifty miles farther south its vegetation is more vigorous, but it is still

Pl. 2.



Bessa del.

Bessin sc.

Grey Pine.

Pinus rupestris.

YELLOW PINE.

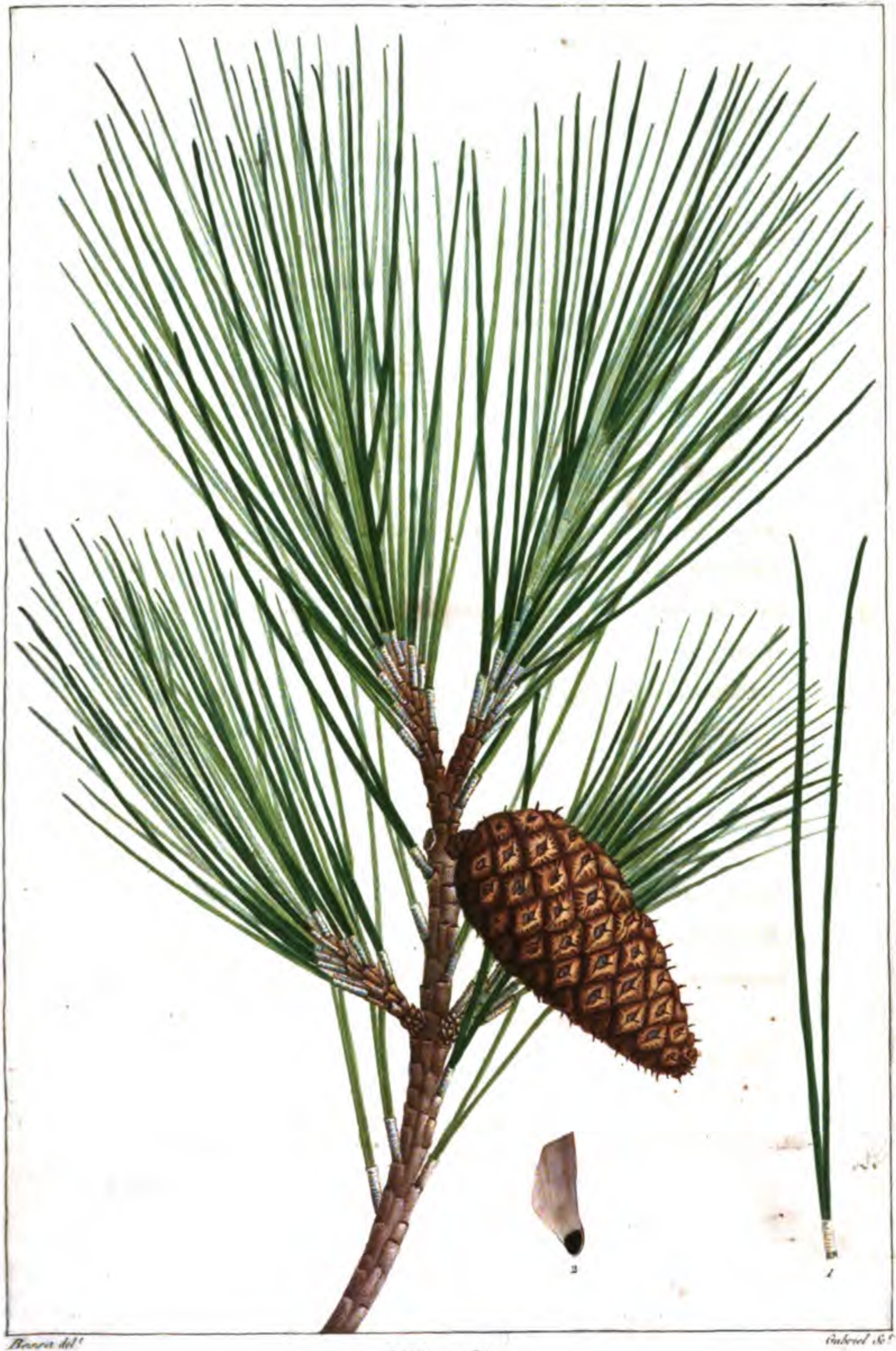
Pinus mitis. *P. arbor maxima; foliis prælongis, tenuoribus, caniculatis; strobilis parvis, conoideo-ovatis; tessulatum mucrone minutissimo.*

Pinus mitis, Mich. Flor. Bor. Am.

This tree is widely diffused in North America, and is known in different places by different names: in the Middle States, where it is abundant and in common use, it is called Yellow Pine, in the Carolinas and Georgia, Spruce Pine, and more frequently Short-leaved Pine.

Towards the North this species is not found beyond certain districts of Connecticut and Massachussets; it is multiplied in the lower part of New Jersey, and still more on the eastern shore of Maryland and in the lower parts of Virginia, where it is seen only upon arid soils. I have, also, met with it on the right bank of the river Hudson at a little distance from Albany, at Chambersburgh in Pennsylvania, near Mudlick in Kentucky, on the Cumberland Mountains and in the vicinity of Knoxville in East Tennessee, at Edgefield Court-house in the upper part of South Carolina, and on the river Oconee in the upper part of Georgia. In all these places it is united with other trees, and enters in a greater or less proportion into the composition of the forests, according to the

Pl. 3.



Bessa del.

Gabriel Sc.

Yellow Pine.

Pinus mitis.

nature of the soil. It abounds on the poorest lands; on those of a certain degree of fertility, which is indicated by the flourishing appearance of the Oaks and Walnuts, it is more rare, though it still surpasses the surrounding trees in bulk and elevation. The Yellow Pine is also occasionally seen in the lower part of the Carolinas, in the Floridas, and probably in Louisiana; but in these regions it grows only in spots consisting of beds of red clay mingled with gravel, which here and there pierce the light covering of sand which forms the surface of the country to the distance of 120 miles from the sea.

The Yellow Pine is a beautiful tree, and this advantage it owes to the disposition of its limbs, which are less divergent the higher they are placed upon the stock, and which are bent towards the body so as to form a summit regularly pyramidical, but not spacious in proportion to the dimensions of the trunk. Its regularity has perhaps given rise to the name of *Spruce Pine.*

In New Jersey and in Maryland this tree is 50 or 60 feet high, and is commonly of an uniform diameter of 15 or 18 inches for two thirds of this distance; in Virginia and the upper part of the Carolinas there are stocks of nearly the same height and of twice this diameter; I have measured several that were between 5 or 6 feet in circumference.

The leaves are 4 or 5 inches long, fine, flexible, hollowed on the inner face, of a dark green, and united in pairs; sometimes, from luxuriancy of vegetation, three are found together on the shoots of the season, but never upon the older branches; there is, therefore, an inaccuracy in the description of this species as a Pine with *two or three leaves*, and in the specific epithet *variabilis*.

The cones are oval, armed with fine spines, and smaller than those of any other American Pine, since they scarcely exceed an inch and a half in length upon old trees. The seeds are cast the first year.

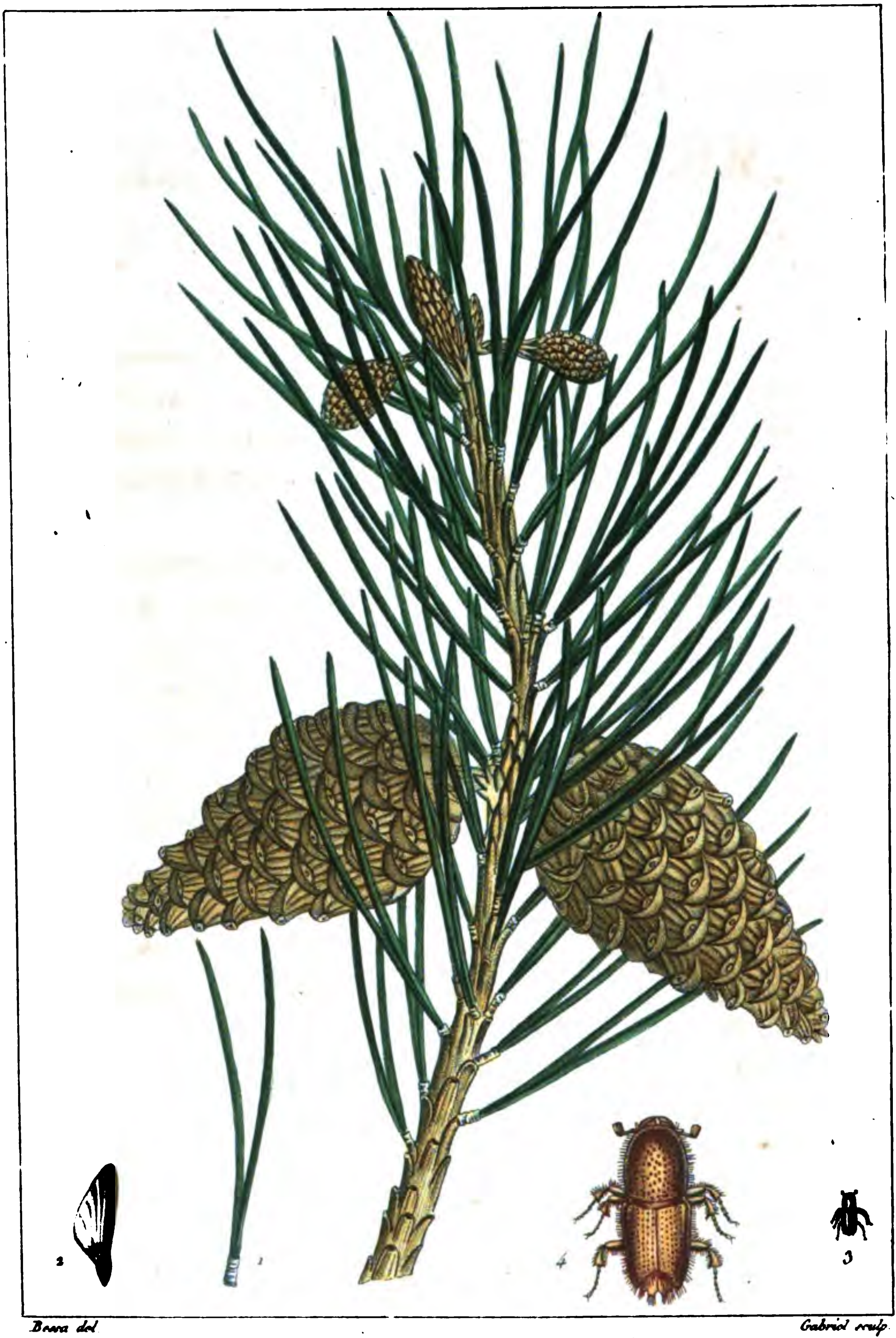
The concentrical circles of the wood are six times as numerous in a given space as those of the Pitch and Loblolly Pines. In trunks 15 or 18 inches in diameter there are only two inches, or two and a half, of sap, and still less in such as exceed this size. The heart is fine-grained and moderately resinous, which renders it compact without great weight. Long experience has proved its excellence and durability. In the Northern and Middle States, and in Virginia, to the distance of 150 miles from the sea, nine-tenths of the houses are built entirely of wood, and the floors, the casings of the doors and wainscots, the sashes of the windows, etc., are made of this species, as more solid and lasting than any other indigenous wood. In the upper part of the Carolinas, where the Cypress and White Cedar do not grow, the houses are constructed wholly of Yellow Pine, and are even covered with it. But for whatever purpose it is employed it should be completely freed from the sap, which speedily decays. This precaution is sometimes neglected in order to procure wider boards, especially near the ports, where, from the constant consumption, the tree is becoming rare. Immense quantities are used in the dock-yards of New York, Philadelphia, Baltimore, etc., for the decks, masts, yards, beams and cabins of vessels, and it is considered as next in durability to the Long-leaved Pine. The wood from New Jersey and Maryland is finer-grained, more compact, and stronger than that from the river Delaware, which grows upon richer lands.

The Yellow Pine, in boards from an inch to two inches and a half thick, forms a considerable article of exportation to the West Indies and Great Britain: in the advertisements of Liverpool it is designated by the name of *New York Pine*, and in those of Jamaica by that of *Yellow Pine*; in both places it is sold at a lower price than the Long-leaved Pine of the Southern States, but much higher than the White Pine.

Though this species yields turpentine and tar, their extraction demands too much labour, as it is always mingled in the forests with other trees. The value of its wood alone renders it, for the middle and north of Europe, the most interesting, except the Red Pine, of the American species. Sir A. B. Lambert begins his latin description of it thus: *Arbor mediocris*, etc., and adds that " it does not exceed 25 or 30 feet in height, is of a spongy consistence, and unfit for building."

PLATE CXXXVII.

A branch with a cone of the natural size. Fig. 1, *A leaf. Fig.* 2, *A seed.*



Bessa del. *Gabriel sculp.*

Wild Pine *or* Scotch Fir.

Pinus sylvestris.

WILD PINE, OR SCOTCH FIR.

PINUS SYLVESTRIS. *P. foliis geminis rigidis, strobilis ovato-conicis, longitudine foliorum; squamis echinatis.*

THE Pines of the Old Continent are less numerous than those already observed in North America. Among them the Wild Pine is the most valuable for the properties of its wood; it is, besides, extensively diffused, and grows in the most dissimilar soils.

In that part of Europe which lies above the 55th degree of latitude, are found immense forests of resinous trees, in general composed entirely of this species: below this parallel the leafy trees begin to mingle with them, and soon exclude them from the forests. In the centre of Europe the Wild Pine abounds only in the coldest and most elevated situations, such as the Pyrenees, the Tyrolian, Swiss and Vosgian Mountains. In Scotland it is so common as to leave no doubt of its being indigenous to that kingdom, though some authors believe it to have come originally from the Continent.

This tree arrives at perfection only in the north of Europe, where it is more than 80 feet high and 4 or 5 feet in diameter. The full-grown trunk is covered with a thick and deeply furrowed bark; the leaves are in pairs, of a pale green, stiff, twisted, and about three inches long; the flowers are of a yellowish tint, and the cones are greyish, of a middling thickness and a little shorter than the leaves. Each scale is surmounted by a retorted spine; the seeds are small, black, and garnished with a reddish wing; they ripen the second year.

The great elevation of the Wild Pine, its uniform diameter, and the excellent quality of its wood, resulting from a just proportion of resinous fluid, render it peculiarly proper for the masts of large ships, and for an infinite variety of secondary uses. A considerable exportation takes place from the north of Europe, especially from Riga, Memel and Dantzick, to the maritime states, particularly to England, where, according to Sir A. B. Lambert, it is known by the name of *red deal*, and in London by that of *yellow deal*. In Poland and Russia the houses in the country are generally constructed of it. This species furnishes four-fifths of the tar consumed in the dock-yards of Europe, which is imported from Archangel, Riga, and other ports of Russia and Norway.

In the north of Europe great ravages are committed in the forests composed of the Wild Pine and Norway Spruce Fir, by several insects of which the most destructive is the *Bostrichus piniperda*. This little animal introduces itself into the cellular integument of the bark, and succeeds in dividing it from the trunk. The separation of the bark prevents the circulation of the sap, and hence results the inevitable death of the tree. It is impossible to oppose an effectual resistance to this winged enemy; but I have been informed by a Polish gentleman that its progress is sometimes arrested by felling all the trees, for a space of 50 yards in breadth, between the part of the forest which it already occupies and that which it threatens to assail.

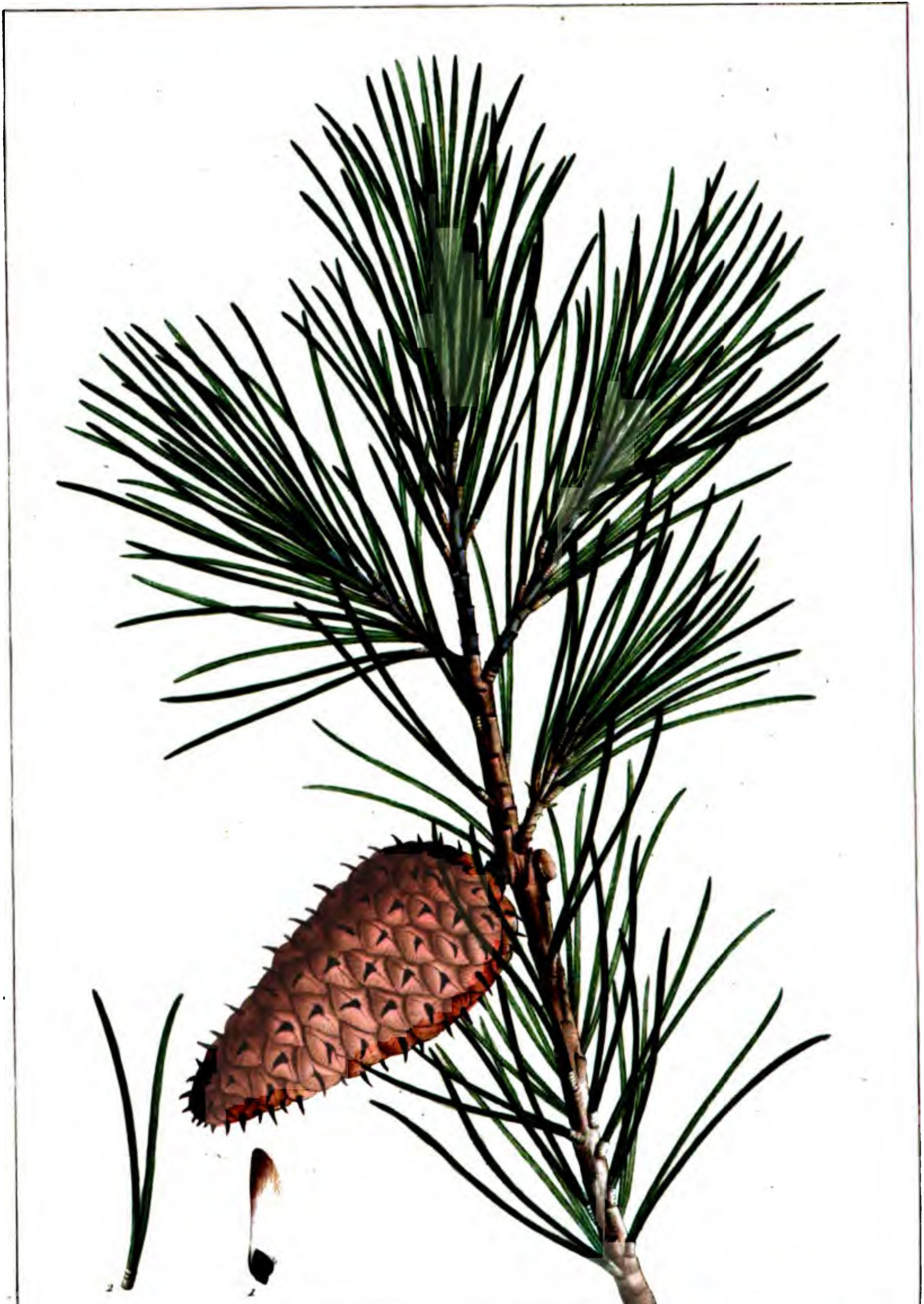
The faculty which I have ascribed to the Wild Pine of growing in climates, soils and exposures extremely different, is of inestimable value, and its cultivation has been successfully attempted on lands abandoned during ages of hopeless sterility. Plantations may be formed from the seed or with young stocks from the nursery: of all the Pines this species bears transplanting with the least injury. It is seen flourishing on sandy wastes exposed to the saline vapours of the sea, and, which is more remarkable, on calcarious lands, a large tract of which in the Department of the Marne, called *la Champagne pouilleuse*, has begun within 40 years to be covered with it, after lying desert from time immemorial. The proprietors who first conceived this fortunate plan have already seen their barren grounds acquire a tenfold value. The oldest plantations yield seeds, which are disseminated by the winds and spring up spontaneously. After the first growth of evergreen trees, the soil becomes capable of sustaining the Birch, the Hornbeam, the Oaks, etc., which in time render it proper for the production of cereal plants. In Belgium large heaths have in this way been transformed into rich arable land.

The culture of the Wild Pine has been found so profitable that seeds or young plants may every where be obtained at a moderate price. April is the most favourable season for sowing the seeds or removing the young stocks: 6 or 8 pounds of seeds should be scattered upon an acre of ground previously sown with half the usual quantity of oats; the roller suffices to cover them. The oats preserve a degree of coolness in the soil, and shelter the young Pines from the ardour of the sun; but great care must be taken not to injure them in the harvest.

The Wild Pine is so different from the White Pine in its foliage, the form of its cones and the quality of its wood, that no comparison can be instituted between them: it is more analogous to the Yellow Pine, to which however it is superior. It might be most profitably cultivated on waste lands in the Northern Section of the United States.

PLATE CXXXVIII.

A branch with a cone of the natural size. Fig. 1, A leaf. Fig. 2, A seed. Fig. 3, Bostrichus piniperda, or Dermestes typographus, of the natural size. Fig. 4, The same insect enlarged.



Bessa del.

Bessin Sculp.

N. Jersey Pine.

Pinus inops.

NEW JERSEY PINE.

Pinus inops. *P. arbor mediocris, ramosa; foliis binis, brevibus; strobilis ovato-acuminatis, solitariis, fuscis; mucronibus tessularum rigidis; deorsum sub-inclinatis.*

Obs. Truncus et ramuli obscure et squalide fusci.

The Jersey Pine has probably been so named from its abounding in the lower part of New Jersey, where the soil is meager and sandy, and where it is often accompanied by the Yellow Pine. It is not, however, confined to this State, for I have seen it in Maryland, Virginia and Kentucky, in Pennsylvania beyond Chambersburg, near the Juniata, and on the *scrubby ridges* beyond Bedford, at the distance of about 200 miles from Philadelphia. In this part of Pennsylvania it is called *Scrub Pine*, and is seen wherever the soil is composed of argillaceous schistus and is consequently poor. The leanness of the land on which it grows is attested by the decrepid appearance of the Scarlet, Red, Black, White and Rock Chesnut Oaks, with which it is mingled. I have never met with it northward of the river Hudson, nor in the Carolinas and Georgia.

This tree is sometimes 30 or 40 feet high and 12 or 15 inches in diameter, but it rarely attains these dimensions. The trunk, which is clad in a blackish bark, tapers sensiby from the base to the summit, and half its length is occupied by limbs remote from each other. The leaves are united in pairs and are of a dark green, one or two inches long, flat on the inner face, stiff and scattered over the young branches, which are very flexible and smooth, while those of the other species are scaly. The wood of the annual shoots is observed to be of a violet tint, which is a character peculiar to this species and to the Yellow Pine.

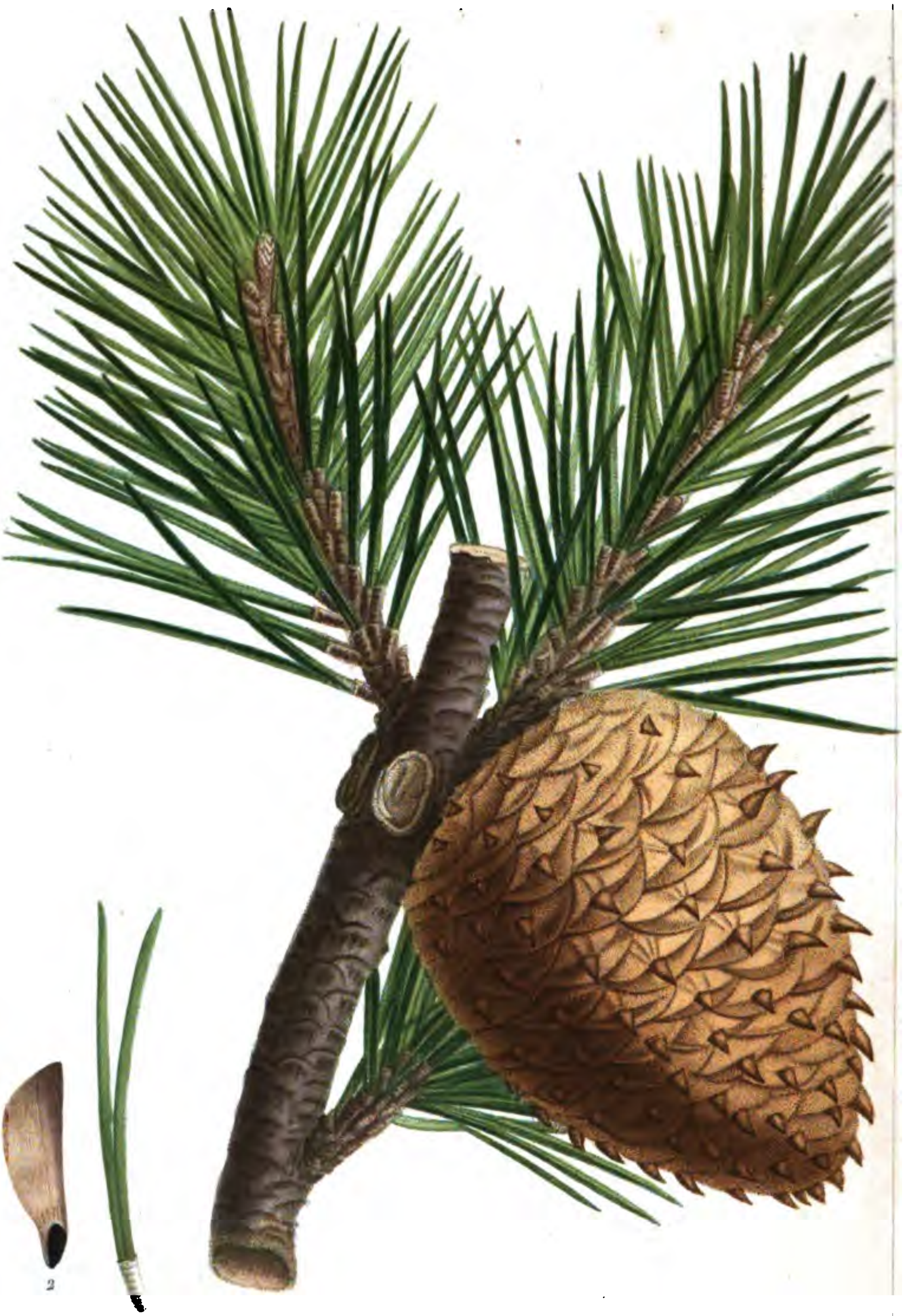
The cones are a little larger than those of the preceding species, or about 2 inches long and an inch in diameter at the base : they are attached by short, thick peduncles, and are armed with long, firm spines, pointed and bent backwards ; they are usually single and directed towards the earth. The seeds are shed the first year of their maturity.

The size of this species of Pine forbids the useful employment of its wood, not to mention the disadvantage under which it labours of containing a large proportion of sap. Near Mudlick in Kentucky a small quantity of tar is obtained from the heart and consumed in the vicinity. I must again dissent from the opinion of Sir A. B. Lambert, who thinks that the flexible branches of the Jersey Pine might serve for hoops : they are too knotty, and would decay in less than six months. Next to the Grey Pine this is the most uninteresting species of the United States.

PLATE CXXXIX.

A branch with a cone of the natural size. Fig. 1, A leaf. Fig. 2, A seed.

Pl. 5.



P. J. Redouté del.

Gabriel Sc.

Table Mountain Pine.

Pinus pungens.

TABLE MOUNTAIN PINE.

Pinus pungens. *P. arbor* 45-50 *pedalis; foliis binis, brevibus et crassis; strobilis turbinatis, præmagnis, flavis, squamis echinatis, spinis luteis, durissimis et basi latioribus.*

The Table Mountain, in North Carolina, one of the highest points of the Alleghanies, at the distance of nearly 300 miles from the sea, has given its name to this species of Pine, which covers it almost exclusively, though it is rare on the neighbouring summits. Nor is it found in any other part of the United States, as my father and myself have become assured by extensive researches. Of all the forest trees of America this species alone is restricted to such narrow limits, and it will probably be among the first to become extinct, as the mountains which produce it are easy of access, are favoured with a salubrious air and a fertile soil, and are rapidly peopling; besides which, their forests are frequently ravaged by fire.

The Table Mountain Pine is 40 or 50 feet in height with a proportional diameter. The buds are resinous, and the leaves, which grow in pairs, are thick, stiff, and about 2 inches and a half in length. The cones are about 3 inches long and 2 inches in diameter at the base, of a regular form and a light yellow colour: they are sessile, and often united to the number of four. Each scale is armed with a strong, ligneous spine, 2 lines in length, widened at the base, and bent towards the summit of the cone.

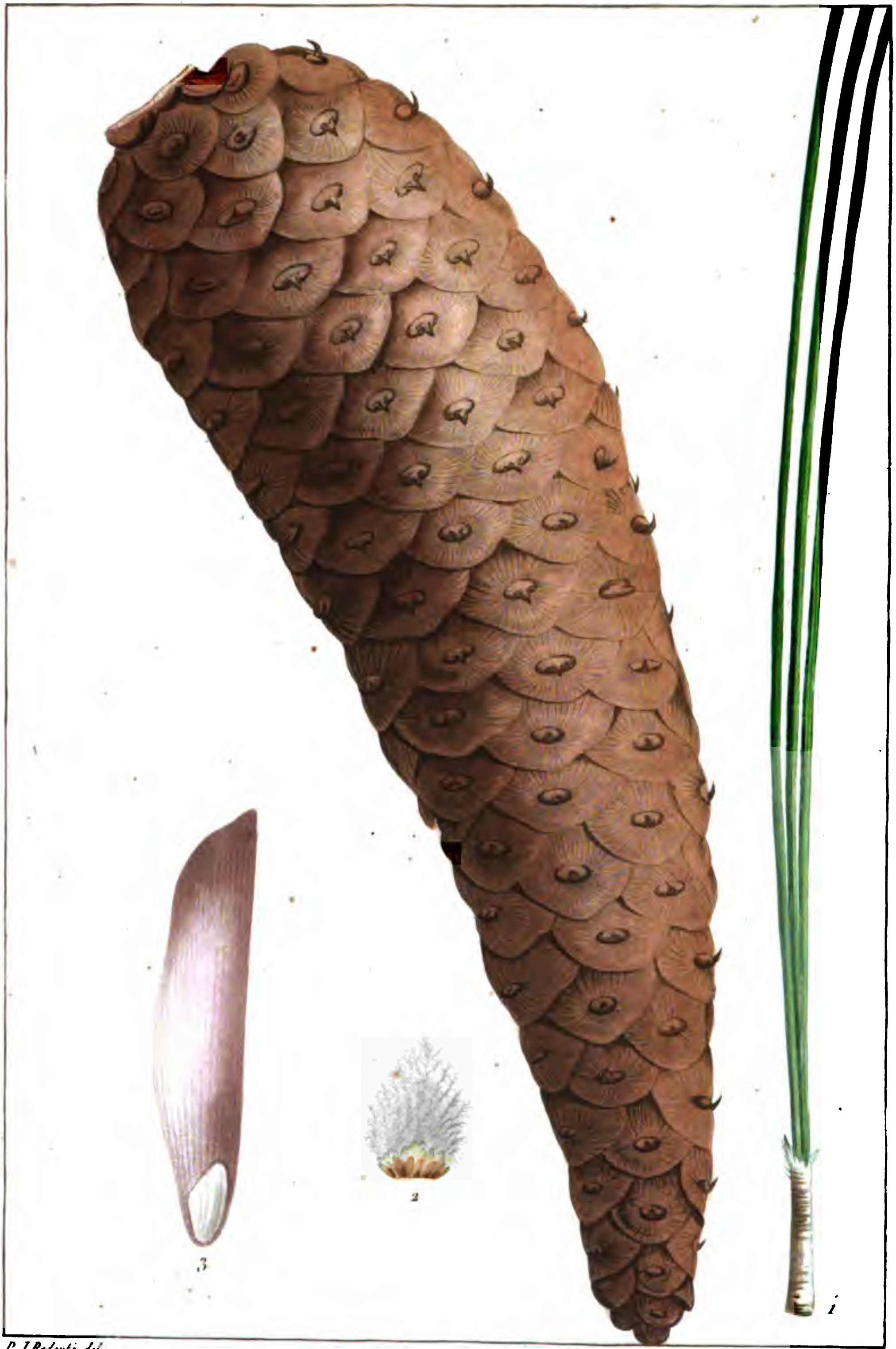
This tree divides itself in numerous ramifications. It is appropriated to no particular use, but in the mountains of North Carolina its turpentine is preferred to every other as a dressing for wounds. I cannot discover the slightest difference between this resin and that of the Pitch Pine, and it is a remarkable fact that all the Pines, though differing widely from each other, yield a resin so analogous as often to be undistinguishable by the taste and smell.

The Table Mountain Pine has no valuable properties to recommend it to notice in Europe; it will serve only to complete botanical collections and to diversify pleasure grounds.

PLATE CXL.

A branch with a cone of the natural size.

Pl. 6.



P. J. Redouté del.

Bessin Sculpt.

Long Leaved Pine.

Pinus Australis.

LONG-LEAVED PINE.

Pinus australis. *P. arbor maxima; foliis ternis longissimis; amentis masculis longo-cylindraceis, fusco-glaucis, divergentibus; strobilis longissime conoideis, tessularum tuberculo tumido, mucrone minutissimo terminato.*

Pinus palustris. Linn.

This invaluable tree is known both in the countries which produce it, and in those to which it is exported, by different names: in the first it is called Long-leaved Pine, Yellow Pine, Pitch Pine and Broom Pine; in the Northern States, Southern Pine and Red Pine; and in England and the West Indies, Georgia Pitch Pine. I have preferred the first denomination, because this species has longer leaves than any other eastward of the Mississippi, and because the names of Yellow Pine and Pitch Pine, which are more commonly employed, serve in the Middle States to designate two species entirely distinct and extensively diffused. The specific epithet *australis* is more appropriate than that of *palustris,* which has hitherto been applied to it by botanists, but which suggests an erroneous idea of the situations in which it grows.

Towards the north the Long-leaved Pine first makes its appearance near Norfolk in Virginia, where the *pine-barrens* begin. It seems to be especially assigned to dry, sandy soils, and it is found almost without interruption in the lower part of the Carolinas, Georgia and the Floridas, over a tract more than 600 miles long from north-east to south-west, and more than 100 miles broad from the sea towards the mountains of the Carolinas and Georgia. I have ascertained three points, about 100 miles apart, where it does not grow: the first, 8 miles from the river Nuse in North Carolina, on the road from Louisburgh to Raleigh; the second, between Chester and Winesborough in South Carolina; the third, 12 miles north of Augusta in Georgia. Where it begins to show itself towards the river Nuse, it is united with the Loblolly Pine, the Yellow Pine, the Pond Pine, the Black Jack Oak and the Scrub Oak; but immediately beyond Raleigh it holds almost exclusive possession of the soil, and is seen in company with the Pines just mentioned only on the edges of the swamps enclosed in the *barrens*: even there not more than one stock in a hundred is of another species. With this exception the Long-leaved Pine forms the unbroken mass of woods which covers this extensive country. But between Fayetteville and Wilmington, in North Carolina, the Scrub Oak is found in some districts disseminated in the *barrens*, and, except this species of Pine, it is the only tree capable of subsisting in so dry and sterile a soil.

The mean stature of the Long-leaved Pine is 60 or 70 feet, with an uniform diameter of 15 or 18 inches for two-thirds of this height. Some stocks, favoured by local circumstances, attain much larger dimensions, particularly in East Florida. The bark is somewhat furrowed, and the epidermis detaches itself in thin transparent sheets. The leaves are about a foot long, of a beautiful brilliant green, united to the number of three in the same sheath, and collected in bunches at the extremity of the branches : they are longer and more numerous on the young stocks, which are sometimes cut by the negroes for brooms. The buds are very large, white, fringed, and not resinous.

The bloom takes place in April; the male flowers form masses of divergent violet-coloured aments about 2 inches long; in drying they shed great quantities of yellowish pollen, which is diffused by the wind and forms a momentary covering on the surface of the land and water. The cones are very large, being 7 or 8 inches long, and 4 inches thick when open, and are armed with small retorted spines. In the fruitful year they are ripe about the 15th of October, and shed their seeds the same month. The kernel is of an agreeable taste, and is contained in a thin white shell, surmounted by a membrane; in every other species of American Pine the shell is black. Sometimes the seeds are very abundant, and are voraciously eaten by wild turkies, squirrels, and the swine that live almost wholly in the woods. But in the unfruitful year, a forest of a hundred miles in extent may be ransacked without finding a single cone: this probably occasioned the mistake of the French who in 1567 attempted a settlement in Florida, that "the woods were filled with superb Pines that never yielded seed."

The Long-leaved Pine contains but little sap; several trunks 15 inches in diameter at the height of 3 feet, which I have myself measured, had 10 inches of perfect wood. Many stocks of this size are felled for commerce, and none are received for exportation of which the heart is not 10 inches in diameter when squared. The concentrical circles in a trunk fully developed are close and at equal distances, and the resinous matter, which is abundant, is more uniformly distributed than in the other species; hence the wood is stronger, more compact and more durable: it is, besides, fine-grained, and susceptible of a bright polish. These advantages give it a preference over every other Pine: but its quality is modified by the nature of the soil in which it grows; in the neighbourhood of the sea, where only a thin layer of mould reposes on the sand, it is more resinous than where the mould is 5 or 6 inches thick; the stocks that grow upon the first mentioned soil are called Pitch Pine, and the others Yellow Pine, as if they were distinct species.

This wood subserves a great variety of uses in the Carolinas, Georgia and the Floridas: four-fifths of the houses are built of it, except the roof, which is covered with shingles of Cypress; but in the country the roof is also of Pine, and is renewed after 15 or 18 years, a considerable interval in a climate so warm and humid. A vast consumption takes place for the enclosure of cultivated fields. In naval architecture this is the most esteemed of the Pines: in the Southern States, the keel, the beams, the side-planks, and the pins by which they are attached to the ribs, are of this tree. For the deck it is preferred to the true Yellow Pine, and is exported for that purpose to Philadelphia, New York, etc., where it is in request also for the flooring of houses.

In certain soils its wood contracts a reddish hue, and it is for that reason known in the dock-yards of the Northern States by the name of Red Pine. Wood of this tint is considered the best, and in the opinion of some ship-wrights it is more durable on the sides of vessels, and less liable to injury from worms, than the Oak.

The Long-leaved Pine is the only species exported from the Southern States to the West Indies. A numerous fleet of small vessels is employed in this traffic, particularly from Wilmington in North Carolina, and Savannah in Georgia. The stuff destined for the Colonial market is cut into every form required in the construction of houses and of vessels; what is sent to England is in planks from 15 to 30 feet long and 10 or 12 inches broad; they are called *ranging timbers*, and are sold at 8 or 10 dollars a hundred cubic feet. The vessels freighted with this timber repair chiefly to Liverpool, where it is said to be employed in the building of ships and of wetdocks : it is called Georgia Pitch Pine, and is sold 25 or 30 per cent higher than any other Pine imported from the United States.

From the diversified uses of this wood an idea may be formed of the consumption ; to which must be added a waste of a more disastrous kind, which it seems impossible to arrest. Since the year 1804, extensive tracts of the finest Pines are seen covered only with dead trees. In 1802, I remarked a similar phenomenon among the Yellow Pines, in East Tennessee. This catastrophy is felt among the Scotch Firs which people the forests of the north of Europe, and is wrought by swarms of small insects, which lodge themselves in different parts of the stock, insinuate themselves under the bark, penetrate into the body of the tree, and cause it to perish in the course of the year.

The value of the Long-leaved Pine does not reside exclusively in its wood : it supplies nearly all the resinous matter used in the United States in ship-building, and a large residue for exportation to the West Indies and Great Britain. In this view its place can be supplied by no other species : those which afford the same product being dispersed through the woods or collected in inaccessible places. In the Northern States, the lands which, at the commencement of their settlement, were covered with the Pitch Pine, were exhausted in 25 or 30 years, and for more than half a century have ceased to furnish tar.

The *pine-barrens* are of vast extent, and are covered with trees of the finest growth; but they cannot all be rendered profitable from the difficulty of communication with the sea. Formerly tar was made in all the lower parts of the Carolinas and Georgia, and throughout the Floridas vestiges are every where seen of kilns that have served in the combustion of resinous wood. At present, this branch of industry is confined to the lower districts of North Carolina, which furnish almost all the tar and turpentine exported from Wilmington and other ports.

The resinous product of the Pine is of six sorts, viz: turpentine, *scrapings*, spirit of turpentine, rosin, tar and pitch. The two last are delivered in their natural state; the others are modified by the agency of fire in certain modes of preparation. More particularly: turpentine is the sap of the tree obtained by making incisions in its trunk. It begins to distil about the middle of March, when the circulation commences, and flows with increasing abundance as the weather becomes warmer, so that July and August are the most productive months. When the circulation is slackened by the chills of autumn, the operation is discontinued, and the remainder of the year is occupied in preparatory labours for the following season, which consist — first, in making the *boxes*. This is done in January and February: in the base of each tree, about 3 or 4 inches from the ground, and of preference on the south side, a cavity is formed, commonly of the capacity of three pints, but proportioned to the size of the trunk, of which it should occupy a quarter of the diameter; on stocks more than 6 feet in circumference, two, and sometimes four, *boxes* are made on opposite sides. Next comes the *raking*, or the clearing the ground at the foot of the trees from leaves and herbage, by which means they are secured against the fires that are often kindled in the woods by the carelessness of travellers and waggoners. If the flames gain the *boxes* already impregnated with turpentine, they are rendered useless, and others must be made. *Notching* is merely making at the sides of the box two oblique gutters, about 3 inches long, to conduct into it the sap that exudes from the edges of the wound. In the interval of a fortnight, which is employed in this operation, the first boxes become filled with sap. A wooden shovel is used to transfer it to pails, which in turn are emptied into casks placed at convenient distances. To increase the product, the upper edge of the box is *chipped* once a week, the bark and a portion of the alburnum being removed to the depth of four concentrical circles. The boxes fill every three weeks. The turpentine thus procured is the best, and is called *pure dipping*.

The *chippings* extend the first year a foot above the box, and as the distance increases, the operation is more frequently repeated, to remove the sap coagulated on the surface of the wound. The closing of the pores, occasioned by continued rains, exacts the same remedy; and it is remarked that the produce is less abundant in moist and cool seasons. After 5 or 6 years the tree is abandoned; the upper edge of the wound becomes cicatrized, but the bark is never restored sufficiently for the renewal of the process.

It is reckoned that 250 boxes yield a barrel containing 320 lb. Some persons charge a single negro with the care of 4,000 or 4,500 trees of one box; others, of only 3,000, which is an easy task. In general, 3,000 trees yield, in ordinary years, 75 barrels of turpentine and 25 of *scraping*, which supposes the boxes to be emptied five or six times in the season. The *scraping* is a coating of sap which becomes solid before it reaches the boxes, and which is taken off in the fall and added to the last runnings. In November, 1807, the *pure dipping* was sold at Wilmington at 3 dollars a barrel, and the *scraping* a quarter less.

In 1804, the exportation to the Northern States and to the English possessions amounted to 77,827 barrels. During peace it comes even to Paris, where it is called Boston Turpentine. Throughout the United States it is used to make yellow soap of a good quality. The consumption in England is great, and, in the official statements, the value imported in 1807 is 465,828 dollars; in 1805, Liverpool alone received 40,294 barrels, and in 1807, 18,924 barrels. It was sold there in August 1807, at 3 dollars a hundred pounds, and after the

American embargo, in 1808, at 8 or 9 dollars. Oddy omits, in his list of articles exported from Archangel and Stockholm to Great Britain, the resinous product of the Pine, which has amounted to 100,000 barrels of tar in a year.

A great deal of spirits of turpentine is made in North Carolina : it is obtained by distilling the turpentine in large copper retorts, which are of an imperfect shape, being so narrow at the mouth as to retard the operation. Six barrels of turpentine are said to afford one cask or 122 quarts of the spirit. It is sent to all parts of the United States, even to the Western Country by the way of Philadelphia, to England, and to France, where it is preferred, as less odorous, to that made near Bordeaux. In 1804, 19,526 gallons were exported from North Carolina. The residuum of the distillation is *rosin*, which is sold at one third of the price of turpentine. The exportation of this substance, in 1804, was 4,675 barrels.

All the tar of the Southern States is made from dead wood of the Long-leaved Pine, consisting of trees prostrated by time or by the fire kindled annually in the forests, of the summits of those that are felled for timber, and of limbs broken off by the ice which sometimes overloads the leaves.[1]

It is worthy of remark that the branches of resinous trees consist almost wholly of *wood*, of which the organization is even more perfect than in the body of the tree; the reverse is observed in trees with deciduous leaves : the explanation of the phenomenon I leave to persons skilled in vegetable physiology. As soon as vegetation ceases in any part of the tree, its consistence speedily changes; the sap decays, and the heart, already impregnated with resinous juice, becomes surcharged to such a degree as to double its weight in a year : the accumulation is said to be much greater after 4 or 5 years: the general fact may be proved by comparing the wood of trees recently felled, and of others long since dead.

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[1] See Travels West of the Alleghanies, by F. A. Michaux. Paris. 1803.

To procure the tar, a *kiln* is formed in a part of the forest abounding in dead wood : this is first collected, stript of the sap, and cut into billets two or three feet long and about three inches thick; a task which is rendered long and difficult by the knots. The next step is to prepare a place for piling it : for this purpose, a circular mound is raised, slightly declining from the circumference to the centre, and surrounded with a shallow ditch. The diameter of the pile is proportioned to the quantity of wood which it is to receive: to obtain 100 barrels of tar, it should be 18 or 20 feet wide. In the middle is a hole with a conduit leading to the ditch, in which is formed a receptacle for the resin as it flows out. Upon the surface of the mound, beaten hard and coated with clay, the wood is laid round in a circle like rays.

The pile, when finished, may be compared to a cone truncated at two-thirds of its height and reversed, being 20 feet in diameter below, 25 or 30 feet above, and 10 or 12 feet high. It is then strewed with pine-leaves, covered with earth, and contained at the sides with a slight cincture of wood. This covering is necessary in order that the fire kindled at the top may penetrate to the bottom with a slow and gradual combustion : if the whole mass was rapidly inflamed, the operation would fail and the labour in part be lost : in fine, nearly the same precautions are exacted in this process as are observed in Europe in making charcoal. A kiln which is to afford 100 or 130 barrels of tar, is 8 or 9 days in burning.

As the tar flows off into the ditch, it is emptied into casks of 30 gallons, which are made of the same species of wood.

Pitch is tar reduced by evaporation : it should not be diminished beyond half its bulk to be of a good quality.

In 1807, tar and pitch were exported to England from the United States to the amount of 265,000 dollars ; the tar was sold at Liverpool, in August of the same year, at 4 dol. 67 c. a barrel, and when the embargo became known, at 5 dol. 56 c. ; from which inferences may be drawn to the advantage of the United States. At Wilmington, the ordinary price is from 1 dol. 75c. to 2 dol. 20 c. a barrel.

Oddy informs us that the tar brought to England between 1786 and 1799, came in equal proportions from Russia, Sweden and the United States; only a very small quantity was drawn from Denmark. The Swedish tar is the most highly esteemed in commerce, and next, that of Archangel; that of the United States is considered inferior to both, which is owing to its being made from dead wood, while that of Europe is extracted from trees recently felled: I shall speak more particularly of the difference arising from this cause in the description of the Pitch Pine. The tar of Carolina is said also to contain earth; this can be attributable only to the want of care in preparing the receptacles; if the same pains were taken in the fabrication, it would probably equal that of Europe, though it must be considered that the tar of Russia and Sweden is produced by a different tree, a native of the north of Europe. It has already been remarked that in the United States this manufacture is confined to the maritime part of North Carolina, and to a small tract of Virginia; but, according to the rate of consumption in America and Great Britain, the product would not long suffice if all the extensive regions covered with the Long-leaved Pine were made to contribute to this object; for the dead wood is said not to be renewed upon a tract that has been cleared, in less than ten or twelve years. It might be advantageous to make use of green wood, or purposely to strip the trees of their bark; and perhaps in this way supplies might be obtained equivalent to the demands of commerce.

Great benefit would result from stripping the Pines of a certain diameter of their bark; they would pass completely into the resinous state in fifteen months, and would be proper for posts and many other uses which require strong and lasting wood. This experiment, which I should have tried when I was last in South Carolina if the season had not been too far advanced, should be made in April or the beginning of May, while the sap is in active circulation, and the *liber* or inner bark should be exactly removed.

I cannot conclude this protracted article without expressing a wish that the Long-leaved Pine should be introduced upon the wastes near Bordeaux : the soil and climate are perfectly congenial to it, and it would succeed better than in the more northern departments. It would be a valuable addition to our domestic resources, for its wood is superior to that of any Pine of North America, and, as I have proved by comparison, to that of the Bordeaux and Riga Pines. The Red and Yellow Pines, also, are shown to be superior to these European species, by samples which I brought from America.

The figure of the Long-leaved Pine, in Sir A. B. Lambert's work, is correct in the leaves and fruit, but defective in the male flowers. His description is wholly inconsistent with my own observations. The latin phrase begins thus : " *Pinus palustris, arbor mediocris, in paludosis*, etc. The wood is of a reddish white colour, soft, light, and very sparingly impregnated with resin. It soon decays, burns badly, and is so little esteemed that it is not used while any other species of wood can be procured."

PLATE CXLI.

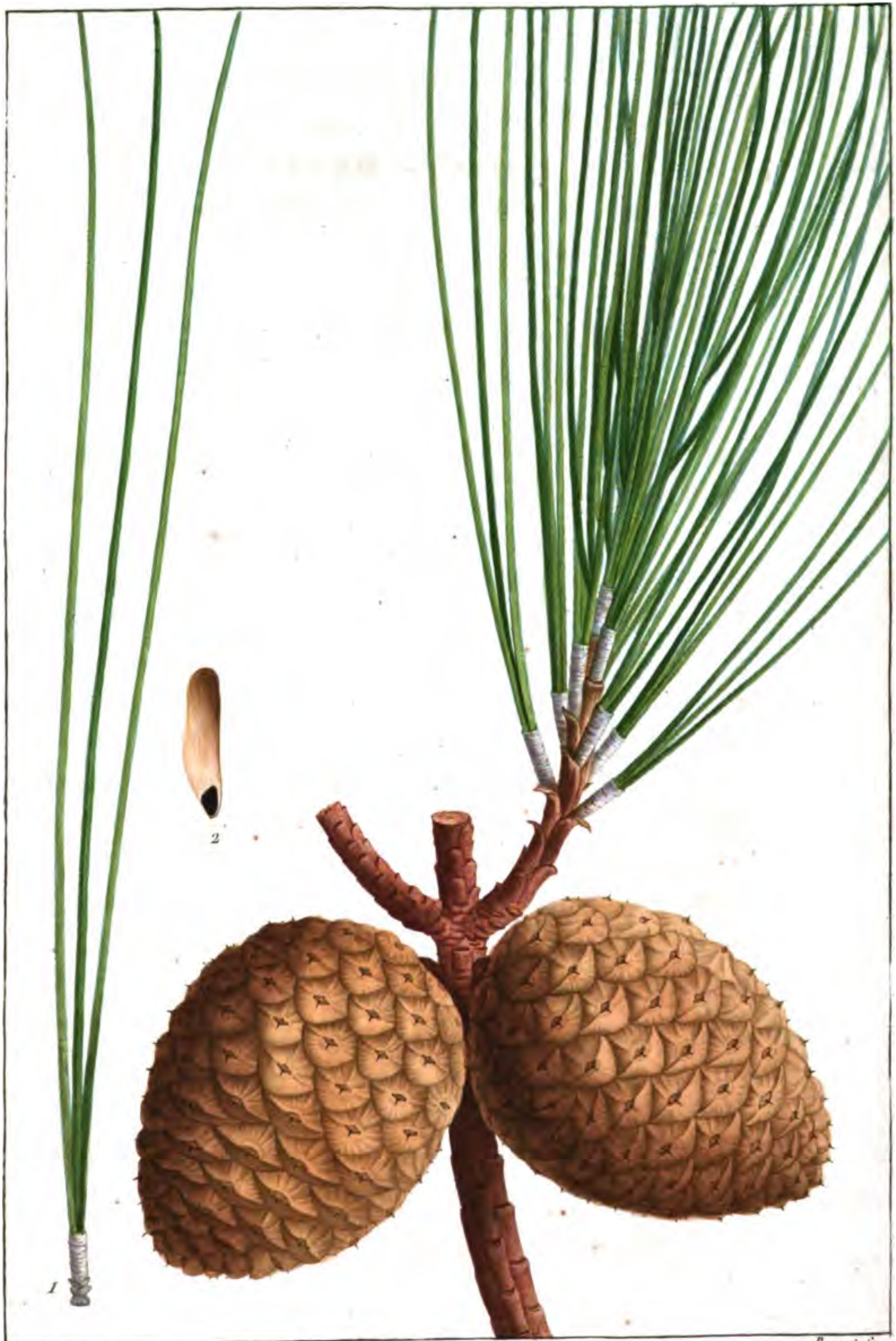
Fig. 1, *A leaf. Fig.* 2, *A bud. Fig.* 3, *A seed.*

POND PINE.

Pinus serotina. *P. arbor 40-45 pedalis; foliis ternis prælongis; amentis masculis erecto incumbentibus; strobilis ovatis, tessularum mucrone minutissimo.*

The Pond Pine frequently recurs in the maritime parts of the Southern States, but is lost as it were among the Long-leaved Pines which cover these regions, and as it is appropriated to no use, and bears a strong family likeness to the rest of the genus, it has received no popular specific name : that which I have given it seems sufficiently appropriate, since it grows principally on the borders of ponds covered with the Pond Bush, *Laurus æstivalis,* and in the small swamps, whose black and miry soil is shaded by the Loblolly Bay, Red Bay, Tupelo, and Small Magnolia or White Bay.

The leaves, united to the number of 3, are 5 or 6 inches in length, and a little more upon young stocks. The aments are straight, and 6 or 8 lines long; the cones are commonly opposite and in pairs, 2 inches and a half in length, 5 inches and a half in circumference, and in form like an egg; their scales are rounded at the extremity, and armed with fine short spines which are easily broken off, so that in some instances no vestige is left of their existence. The cones arrive at maturity the



Bessa del.

Boquet Sc.

Pond Pine.

Pinus serotina.

second year, but do not release their seeds before the third or fourth.

The ordinary size of the tree, which it rarely exceeds, is 35 or 40 feet in height and 15 or 18 inches in diameter. It is remarkable for the remoteness of its branches, which begin to spring upon the lower half of the stock; and more than half of the largest trunks consists of sap; for these reasons the species is useless at home and deservedly neglected abroad.

Observation. The Pond Pine sometimes grows with the Long-leaved Pine in abandoned fields near the swamps. The dryness of the soil occasions no difference in its form. This observation is important, as the species under consideration is frequently confounded with the Pitch Pine, which it strikingly resembles.

PLATE CXLII.

A branch with a cone of the natural size. Fig. 1, *A leaf. Fig.* 2, *A seed.*

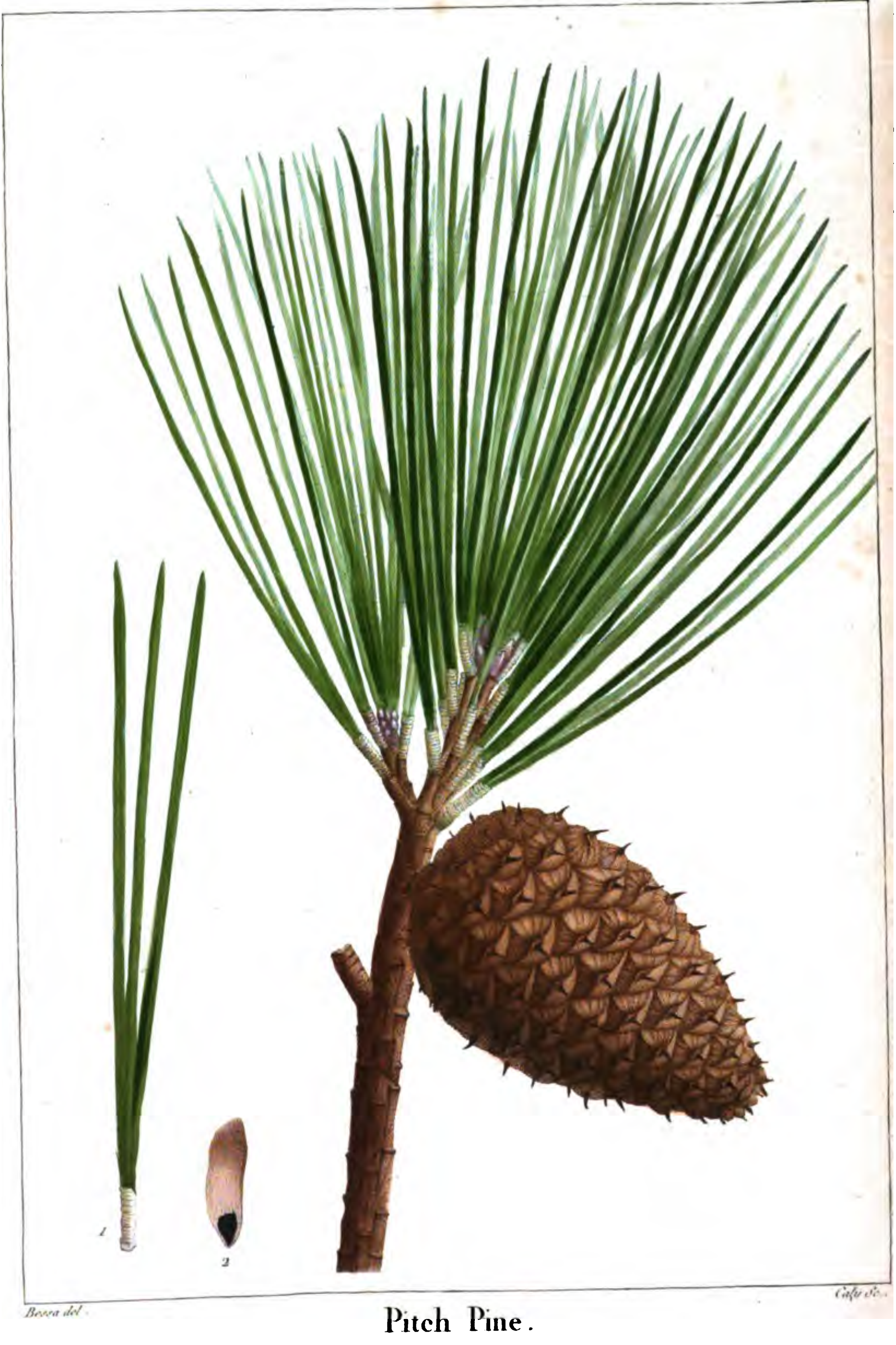
PITCH PINE.

PINUS RIGIDA. *P. arbor ramosa; cortice scabro-rimosa; gemmis resinosis; foliis ternis; amentis masculis erecto-incumbentibus; strobilis sparsis vel aggregatis; squamis echinatis; spinis rigidis.*

THIS species is known in all the United States by the name of *Pitch Pine*, and sometimes in Virginia by that of *Black Pine*, but no where by that of *Three-leaved Virginian Pine* which is used by Sir A. B. Lambert.

Except the maritime part of the Atlantic States, and the fertile regions west of the Alleghany Mountains, it is found throughout the United States, but most abundantly upon the Atlantic coast, where the soil is diversified but generally meager. The vicinity of Brunswick in the District of Maine, and of Burlington on Lake Champlain in the State of Vermont, are the most northern points at which I have observed it; in these places it commonly grows in light, even, friable, sandy soils, which it occupies almost exclusively. It does not exceed 12 or 15 feet in height, and its slender branches, laden with puny cones, evince the feebleness of its vegetation.

In Pennsylvania and Virginia the ridges of the Alleghanies are sometimes covered with it, as I have remarked in travelling from Philadelphia to Pittsburgh, and particularly in traversing the *South Mountains*, on



Bessa del.

Cafir Sc.

Pitch Pine.

Pinus Rigida.

the ridge called *Saddle Hill*, 30 miles from Bedford. Here the soil is a little more generous, consisting of clay thickly sown with stones, and the Pitch Pine is 35 or 40 feet high, and 12 or 15 inches in diameter.

In the lower part of New Jersey, Pennsylvania and Maryland, it is frequently seen in the large swamps filled with the Red Cedar, which are constantly miry or covered with water; in such situations it is 70 or 80 feet high and from 20 to 28 inches in diameter, and exceeds the surrounding trees both in bulk and elevation. It supports a long time the presence of sea-water, which in spring-tides overflows the salt-meadows, where it is sometimes found alone of its genus.

The buds of the Pitch Pine are always resinous, and its triple leaves vary in length from an inch and a half to 7 inches, according to the degree of moisture in the soil. The aments are an inch long, straight and winged like those of the Pond Pine. The size of the cones depends upon the nature of the soil, and varies from less than an inch to more than three inches in length; they are of a pyramidal shape, and each scale is pointed with an acute spine about two lines long. Wherever these trees grow in masses the cones are dispersed singly over the branches, and, as I have learned by constant observation, they release the seeds the first autumn after their maturity; but on solitary stocks, exposed to the buffeting of the winds, the cones are collected in groups of four, five, or even a larger number, and remain closed for several years. This clustering of the cones serves, also, to distinguish the Jersey and Table Mountain Pines.

The Pitch Pine has a thick, blackish, deeply furrowed bark. It is remarkable for the number of its branches, which occupy two thirds of its trunk and render the wood extremely knotty. The concentrical circles are widely distant, and three fourths of the larger stocks consist of sap. On mountains and gravelly lands the wood is compact, heavy, and surcharged with resin, whence is derived the name of *Pitch Pine:* in swamps, on the contrary, it is light, soft, and composed almost wholly of sap; it is then called *Sap Pine.* These essential defects place it below the Yellow Pine, but as that species is daily dwindling by the vast consumption in civil and naval architecture, it is partially replaced by the Pitch Pine, the poorer variety of which is used for the boxes employed in packing certain sorts of merchandize, such as soap, candles, etc.

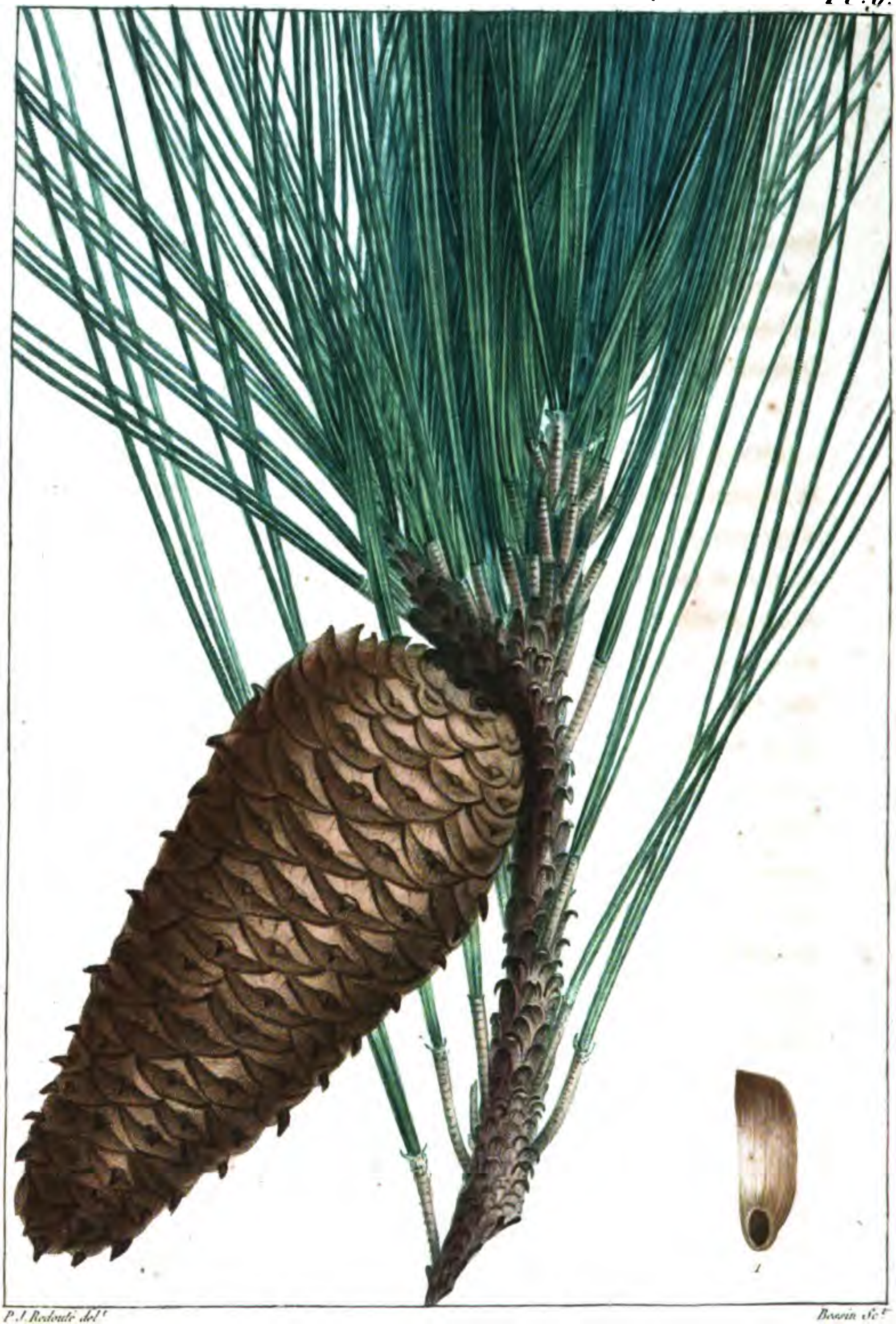
On some parts of the Alleghanies, where this tree abounds, houses are built of it, and the wood, if it is not covered with paint, is recognized by its numerous knots. It is thought better than the Yellow Pine for floors that are frequently washed, as the resin with which it is impregnated renders it firmer and more durable. It serves perfectly well for ship-pumps, for which purpose trees with very little heart are preferred. The bakers of New York, Philadelphia and Baltimore, and the brick-makers in the vicinity of these cities, consume it in prodigious quantities; it is sold at Philadelphia at 6 dollars a cord. From the most resinous stocks is procured the lamp-black of commerce.

The Pitch Pine seems to have formerly abounded in Connecticut, Massachusetts and New Hampshire; for, since the beginning of the seventeenth century till 1776, they have furnished a certain quantity of tar. About the year 1705, upon a misunderstanding with Sweden, whence she had drawn her supplies, Great Britain encouraged this branch of industry in the northern part of America by a premium of one pound sterling for eight barrels of tar made from dead wood, and of two pounds for the same quantity extracted from green trees. The method of depriving the trees of their bark and felling them the following year, whose excellence has since been proved by Buffon's experiments on the conversion of alburnum into perfect wood, and which might be profitably applied in the United States, was published and disseminated. In consequence of this encouragement, or from other causes, the destruction has been so rapid that the Northern States no longer furnish turpentine or tar for their own consumption. The little tar that is made on the shores of Lake Champlain is used on the small vessels that ply upon its surface, or is sent to Quebec. A few of the poorer inhabitants in the maritime part of New Jersey live by this resource, and the product of their industry is sent to Philadelphia, where it is less esteemed than the tar of the Southern States. What is required for the few vessels that are annually launched on the Ohio, is obtained at an exorbitant price from the Alleghany Mountains, and from the borders of Tar Creek, which empties into the Ohio 20 miles below Pittsburgh. The essence of turpentine used in the western country in painting is drawn from Philadelphia and Baltimore.

Such is the sum of my information concerning the Pitch Pine; I have already remarked that on dry gravelly soils its wood is knotty, and on humid lands, of so poor a quality as to be unfit for works that require strength and durability. Several other species are preferable to this, such as the Yellow and Red Pines, which grow in the same soils, and are sometimes associated with it in the forests.

PLATE CXLIII.

A branch with a cone of the natural size. Fig. 1, A leaf. Fig. 2, A seed.



P. J. Redouté del^{t} Bessin Sc^{t}

Loblolly Pine.

Pinus tæda.

LOBLOLLY PINE.

Pinus tæda. *P. arbor maxima, supernè patula; foliis ternis, prœlongis; amentis masculis divergentibus; strobilis 4 uncialibus; tessulis mucrone sursum rigide uncinato; fructiferis sub-rhomboideis.*

Throughout the lower part of the Southern States this species is called *Loblolly Pine*, and sometimes *White Pine* about Petersburgh and Richmond in Virginia. I observed it for the first time near Fredericksburgh, 230 miles south of Philadelphia, and I believe it does not exist much farther north; it certainly is not found in Pennsylvania, as Sir A. B. Lambert mistakingly asserts after Vanghenheim.

In the lower part of Virginia, and in the districts of North Carolina situated north-east of the river Cape Fear, over an extent of nearly 200 miles, it grows wherever the soil is dry and sandy; on spots consisting of red clay mingled with gravel it is supplanted by the Yellow Pine and by different species of Oak: the two Pines are regularly alternated according to the variations int he soil, and frequently vanish and reappear at intervals of 4 or 5 miles.

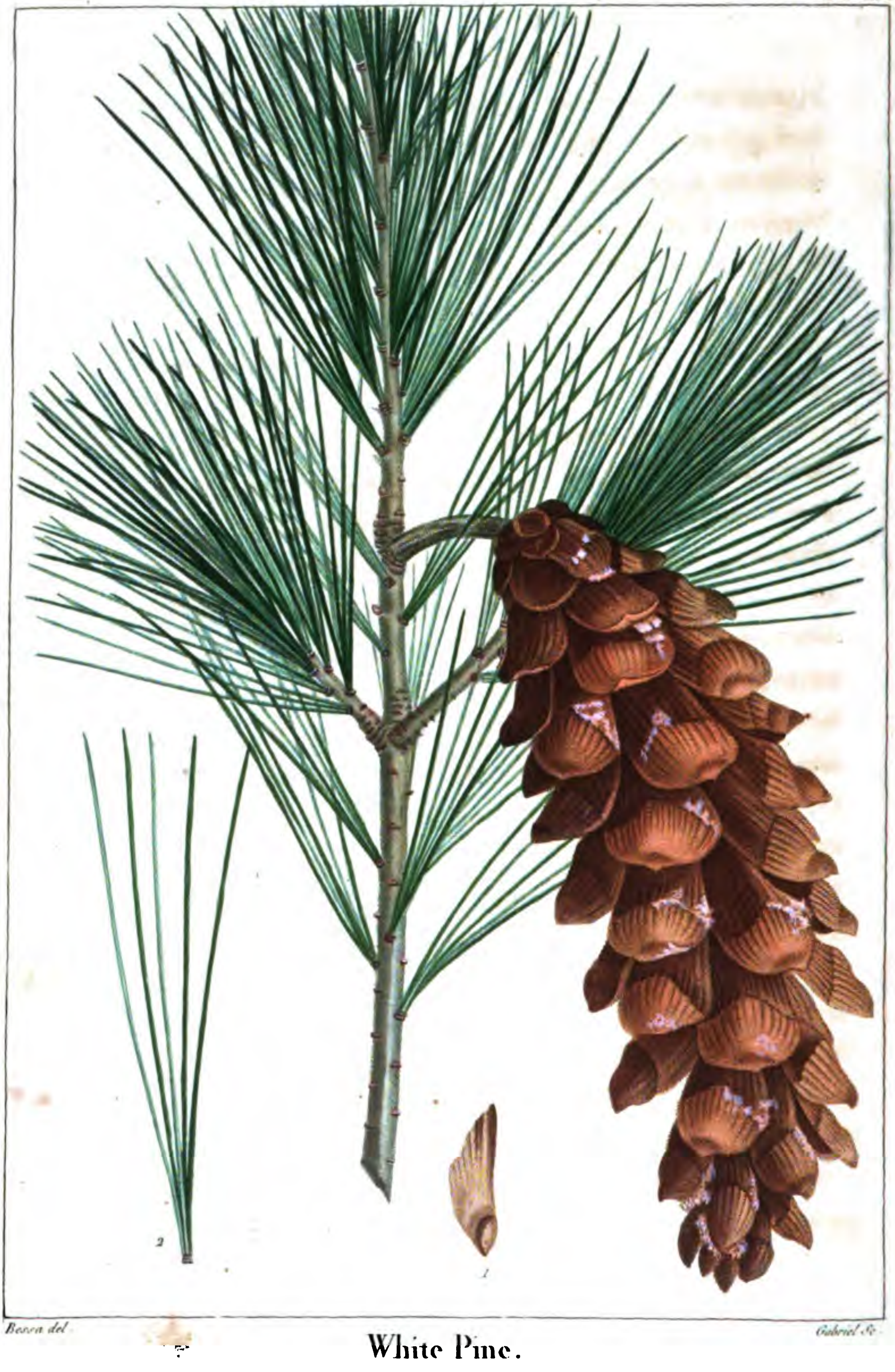
In the same parts of Virginia this species exclusively occupies lands that have been exhausted by cultivation, and amid forests of Oak tracts of 100 or 200 acres are not unfrequently seen covered with thriving young portant acquisition to the South of Europe, where a tree of fine appearance and rapid vegetation is an invaluable treasure. It might be employed in joinery for objects concealed from sight, for packing-cases, etc. It remains to be proved whether it would not grow more rapidly than the Maritime Pine on the plains of Bordeaux. It supports a more northern climate, and even fructifies at Paris, but probably does not attain its perfect developement.

It affords turpentine in abundance, but in a less fluid state than that of the Long-leaved Pine : as it contains more alburnum, from which the turpentine distils, perhaps by making deeper incisions it would yield a greater product.

The figure of this species in Sir A. B. Lambert's work is correct; but he mistakes in describing it as of little stature : *arbor humilis,* etc.; it is, on the contrary, next to the White Pine, the tallest tree of its genus in the United States.

PLATE CXLIV.

A branch with a cone of the natural size. Fig. 1, A leaf. Fig. 2, A seed.



Bessa del. Gabriel Sc.

White Pine.

Pinus Strobus.

WHITE PINE.

PINUS STROBUS. *P. arbor excelsa cortice lævi, cinereo ætate; foliis quinis, gracilibus, vaginis nullis; amentis masculis parvis, rufis; strobilis lævigatis pendulis longo-cylindraceis.*

THIS species, one of the most interesting of the American Pines, is known in Canada and the United States by the name of *White Pine*, from the perfect whiteness of its wood when freshly exposed, and in New Hampshire and Maine, by the secondary denominations of *Pumpkin Pine*, *Apple Pine* and *Sapling Pine*, which are derived from certain accidental peculiarities.

The leaves of the White Pine are five-fold, 4 inches long, numerous, slender, and of a bluish green: to the lightness and delicacy of the foliage is owing the elegant appearance of the young trees. The male aments are 4 or 5 lines long, united to the number of 5 or 6, and arranged like those of the Loblolly and Long-leaved Pines; they turn reddish before they are cast. The cones are 4 or 5 inches long, 10 lines in diameter in the middle, pedunculated, pendulous, somewhat arched, and composed of thin, smooth scales, rounded at the base. They open about the first of October to release the seeds, of which a part are left adhering to the turpentine that exudes from the scales.

This tree is diffused, though not uniformly, over a vast extent of country; it is incapable of supporting intense cold, and still less extreme heat. My father, in returning from Hudson's Bay, after traversing 300 miles without perceiving a vestige of it, first observed it about 40 leagues from the mouth of the Mistassin, which discharges itself into Lake St. John in Canada, in the latitude of 48° 50′. Two degrees farther south he found it common, which was doubtless owing rather to a difference of soil than of climate. From his observations and my own it appears to be most abundant between the 43d and 47th degrees of latitude; farther south it is found in the vallies and on the declivities of the Alleghanies to their termination, but at a distance from the mountains on either side its growth is forbidden by the warmth of the climate. It is said with great probability to be multiplied near the source of the Mississippi, which is in the same latitude with the District of Maine, the upper part of New Hampshire, the State of Vermont and the commencement of the St. Lawrence, where it attains its greatest dimensions. In these countries I have seen it in very different situations, and it seems to accommodate itself to all varieties of soil except such as consist wholly of sand and such as are almost constantly submerged. But I have seen the largest stocks in the bottom of soft, friable and fertile vallies, on the banks of rivers composed of deep, cool, black sand, and in swamps filled with the White Cedar and covered with a thick and constantly humid carpet of *sphagnum*. Near Norridgewock on the river Kennebeck, in one of these swamps, which is accessible only in midsummer, I measured two trunks felled for canoes, of which one was 154 feet long and 54 inches in diameter, and the other, 142 feet long and 44 inches in diameter, at three feet from the ground. Mention is made in Belknap's History of New Hampshire of a White Pine felled near the river Merrimack, 7 feet 8 inches in diameter, and near Hollowell I saw a stump exceeding 6 feet: these enormous stocks had probably reached the greatest height attained by the species, which is about 180 feet: I have been assured by persons worthy of belief that in a few instances they had felled individual trees of nearly this stature. Hence we must conclude that the authors who have stated its height at 260 feet have been misled by incorrect reports.

But this ancient and majestic inhabitant of the North American forests is still the loftiest and most valuable of their productions, and its summit is seen at an immense distance aspiring towards heaven, far above the heads of the surrounding trees. The trunk is simple for two thirds or three fourths of its height, and the limbs are short and verticillate, or disposed in stages one above another to the top of the tree, which is formed by three or four upright branches seemingly detached and unsupported. In forests composed of the Sugar Maple, the Beeches or the Oaks, where the soil is strong and proper for the culture of corn, as for example on the shores of Lake Champlain, it is arrested at a lower height and diffused into a spacious summit; but it is still taller and more vigorous than the neighbouring trees.

In the District of Maine and the Province of Nova Scotia I have constantly remarked that the White Pine is the foremost tree in taking possession of barren deserted lands, and the most hardy in resisting the impetuous gales from the ocean.

On young stocks not exceeding 40 feet in height the bark of the trunk and branches is smooth and even polished; as the tree advances in age it splits and becomes rugged and grey, but does not fall off in scales like that of the other Pines. The White Pine is, also, distinguished by the sensible diminution of its trunk from the base to the summit, in consequence of which it is more difficult to procure sticks of great length and uniform diameter : this disadvantage, however, is compensated by its bulk and by the small proportion of its alburnum; a trunk of one foot in diameter contains 11 inches of perfect wood.

The wood of this species is employed in greater quantities and far more diversified uses than that of any other American Pine; yet it is not without essential defects; it has little strength, gives a feeble hold to nails, and sometimes swells by the humidity of the atmosphere. These properties are compensated however by others which give it a decided superiority; it is soft, light, free from knots and easily wrought, is more durable, and less liable to split when exposed to the sun, furnishes boards of a great width, and timber of large dimensions, in fine, it is still abundant and cheap.

I have constantly observed the influence of soil to be greater upon resinous than upon leafy trees. The qualities of the White Pine, in particular, are strikingly affected by it. In loose, deep, humid soils, it unites in the highest degree all the valuable properties by which it is characterized, especially lightness and fineness of texture, so that it may be smoothly cut in every direction; and hence, perhaps, is derived the name of *Pumpkin Pine.* On dry, elevated lands, its wood is firmer and more resinous, with a coarser grain and more distant concentrical circles, and it is then called *Sapling Pine.*

Throughout the Northern States, except in the larger capitals, seven-tenths of the houses are of wood, of which three quarters, estimated at about 500,000, are almost wholly of White Pine : even the suburbs of the cities are built of wood. The principal beams of churches and other large edifices are of White Pine.

The ornamental work of outer doors, the cornices and frizes of apartments, and the mouldings of fireplaces, which in America are elegantly wrought, are of this wood. It receives gilding well, and is therefore selected for looking-glass and picture frames. Sculptors employ it exclusively for the images that adorn the bows of vessels, for which they prefer the variety called *Pumpkin Pine.*

At Boston, and in other towns of the Northern

States, the inside of mahogany furniture and of trunks, the bottom of windsor chairs of an inferior quality, water-pails, a great part of the boxes used for packing goods, the shelves of shops, and an endless variety of other objects, are made of White Pine.

In the District of Maine it is employed for barrels to contain salted fish, especially the variety called *Sapling Pine,* which is of a stronger consistence. For the magnificent wooden bridges over the Schuylkill at Philadelphia and the Delaware at Trenton; and for those which unite Cambridge and Charleston with Boston of which the first is 1,500 and the second 3,000 feet in length, the White Pine has been chosen for its durability. It serves exclusively for the masts of the numerous vessels constructed in the Northern and Middle States, and for this purpose it would be difficult to replace it in North America. Before the war of Independance, England is said to have furnished herself with masts from the United States, and she still completes from America the demand which cannot be fully supplied from the north of Europe : the finest timber of this species is brought from Maine, and particularly from the river Kennebeck.

Soon after the establishment of the Colonies, England became sensible of the value of this resource, and solicitous for its preservation. In 1711 and 1721, severe ordinances were enacted, prohibiting the cutting of any trees proper for masts on the possessions of the crown. The order comprised the vast countries bounded on the south by New Jersey and on the north by the upper limit of Nova Scotia: I am unable to say with what degree of rigour it was enforced before the American revolution, but for a space of 600 miles, from Philadelphia to a distance beyond Boston, I did not observe a single stock of the White Pine large enough for the mast of a vessel of 600 tons.

The principal superiority of the White Pine masts over those brought from Riga is their lightness; but they have less strength, and are said to decay more rapidly between decks and at the point of intersection of the yards: this renders the Long-leaved Pine superior to the White Pine in the opinion of the greater part of American ship-builders. But some of them are of opinion that the White Pine would be equally durable if the end was carefully protected from the weather. With this view an experiment has been imagined of a hole several feet deep made in the top of the mast, filled with oil, and hermetically sealed; the oil is said to be absorbed in a few months. The bowsprits and yards of ships of war are of this species.

The wood is not resinous enough to furnish turpentine for commerce, nor would the labour of extracting it be easy, since the White Pine occupies exclusively tracts of only a few hundred acres, and is usually mingled in different proportions with the leafy trees.

The vast consumption of this tree for domestic use, and for exportation to the West Indies and to Europe, renders it necessary every year to penetrate farther into the country, and inroads are already made, in quest of this species only, upon forests which probably will not be cleared for cultivation in 25 or 30 years.

The persons engaged in this branch of industry are in general emigrants from New Hampshire, lead by inconstancy of character or by the desire of amassing rapidly the means of purchasing a hundred acres of land[1] for the establishment of their families. In the summer they unite in small companies, and traverse these vast solitudes in every direction to ascertain the places in which the Pines abound. After cutting the grass and converting it into hay for the nourishment of the cattle to be employed in their labour, they return home. In the beginning of winter they enter the forests again, establish themselves in huts covered with the bark of the Canoe Birch or the Arbor Vitæ, and though the cold is so intense that the mercury sometimes remains for several weeks from 40 to 45 degrees[2] below the point of congelation, they persevere with unabated courage in their work. When the trees are felled they cut them into logs from 14 to 18 feet long, and by means of their cattle, which they employ with great dexterity, drag them to the river, and, after stamping on them a mark of property, roll them upon its frozen bosom. At the breaking up of the ice in the spring they float down with the current. All the logs that come down the Kennebeck are stopped at Winslow, about 120 miles from the sea, where each person selects his own and forms them into rafts with the intention of selling them to the proprietors of the numerous saw-mills between that place and the sea, or of having them sawn for his own benefit at the price of a half or even of three quarters of the product in abundant years.

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[1] The price of land in the County of Kennebeck, in 1807, was 5 or 6 dollars an acre.

[2] Of Farenheit's scale.

When I was at Winslow in August 1806, the river was still covered with thousands of logs, of which the diameter of the greater part was 15 or 16 inches, and that of the remainder (perhaps one fiftieth of the whole) 20 inches. The Blue Ash and the Red Pine were the only species mingled with them, and these not in the proportion of one to a hundred. The logs which are not sawn the first year are attacked by large worms, which form in every direction holes about two lines in diameter; but if stript of the bark they remain uninjured for thirty years : the same remark is applicable to the stumps, which resist the influences of heat and moisture during a great length of time, and it has passed into proverb that the man who cuts down a Pine never lives to see it decay. In Hollowell, near the Kennebeck, I saw several stumps unchanged after an exposure of forty years. Next to the District of Maine, which furnishes three quarters of the White Pine exported from the

United States, including what comes from New Hampshire by the Merimack and is brought to Boston, the shores of Lake Champlain appeared to be the most abundantly peopled with this species, and to be not unfavourably situated for its transportation. All that is cut beyond Ticonderaga, comprising about three-fourths of the length of the lake, which is 150 miles from north to south, is carried to Quebec, 270 miles distant, by the Sorel and the St. Lawrence. What is furnished by the southern part of the lake is sawn at Skeensborough, transported 70 miles in the winter on sledges to Albany, and, with all the lumber of the North river, brought down in the spring to New York in sloops of 80 or 100 tons, to be afterwards exported in great part to Europe, the West Indies, and the Southern States.

By an extract from the custom-house register of Fort St. John, the quantity of this wood that passed down the Sorel for Quebec, between the first of May 1807 and the 30th of July following, was 132,720 cubic feet of square timber, 160,000 feet of common boards, 67,000 feet of planks two inches thick, 20 masts, and 4,545 logs of the same dimensions as are brought from the District of Maine.

The upper part of Pennsylvania, near the source of the Delaware and Susquehannah, which is mountainous and cold, possesses large forests of this Pine, and in the spring the timber floats down these streams for the internal consumption of the State. It enters into the construction of houses both in the country and in the towns, and is sawn into planks for exportation from Philadelphia to the West Indies. The masts of vessels built at Philadelphia are also obtained from the Delaware.

Beyond the mountains, near the springs of the river Alleghany, from 150 to 180 miles from its junction with the Ohio, is cut all the White Pine destined for the market of New Orleans, which is 2,900 miles distant. In the spring, immense quantities descend the river for the consumption of the country. Three quarters of the houses of Wheeling, Marietta and Pittsburgh, and of Washington in Kentucky, are built with White Pine boards, which are sold at Pittsburgh at 6 or 7 dollars a thousand feet.

Boston is the principal emporium of this commerce in the Northern States. The White Pine is found there in the following forms: — In square pieces from 12 to 25 feet long, and of different diameters; in *scantling*, or square pieces 6 inches in diameter, for the lighter part of frames; and in boards, which are divided into *merchantable* or *common*, and into *clear* or *picked* boards. The merchantable boards are three fourths of an inch thick, from 10 to 15 inches wide, from 10 to 15 feet long, and frequently deformed with knots: at New York they are called Albany boards, and are sold at the same price as at Boston, or from 8 to 10 dollars a thousand feet. The clear boards, formed from the largest stocks of the Pumpkin Pine, are of the same length and thickness as the first, and 20, 24 and 30 inches wide. They should be perfectly *clear*, but they are admitted if they have only two knots small enough to be covered with the thumb : they are sold at 20 to 26 dollars a thousand feet, and are employed for all light and delicate works of joinery, particularly for the panels of doors and the mouldings of apartments : at Philadelphia they are called *White Pine panels.*

This wood is also formed into *clap-boards* and *shingles.* The clap-boards are of an indeterminate length, 6 inches wide, 3 lines thick at one edge, and thinner at the other : they form the exterior covering of houses, and are placed horizontally lapping one upon another, so that the thinner edge is covered. The shingles are commonly 18 inches long, from 3 to 6 inches wide, 3 lines thick at one end, and one line at the other : they should be free from knots, and made only of the perfect wood. They are packed in square bundles, and sustained by two cross pieces of wood confined by withes. The bundles sometimes consist of 500, but oftener of 250 shingles : the price at Hollowell, in 1807, was 3 dollars a thousand: two men can make 16 or 18 hundred in a day.

East of the river Hudson the houses are almost invariably covered with these shingles, which last only 12 or 15 years. They are exported in great quantities to the West Indies, and in the French islands they are called *essentes blanches.*

From these details an estimate may be formed of the consumption of the White Pine in the United States : that of Europe and the West Indies is also considerable. In a table of importation from the United States presented to the Parliament of Great Britain, the timber introduced in 1807 is reckoned at 1,302,980 dollars, of which I suppose the White Pine to have formed a fifth. In 1808 it was sold at Liverpool at about 60 cents the cubic foot. Planks 2 inches thick and 12 wide were worth 4 cents a foot, and common planks 6 cents.

In this statement the wood imported from New Brunswick is not included, nor the vast quantities sent from the United States to the West India Islands not dependent upon Great Britain.

The precious qualities and varied uses of this tree are sufficient motives for propagating it in Europe. It flourishes in the centre of France, but it would succeed better on the borders of the Rhine, in the vallies of the Alps and Pyrenees, and in the cold and humid climates of Germany, Poland and Russia : its vegetation appeared to me more vigorous in Belgium than in the neighbourhood of Paris. When the forests of Wild Pine and of Norway Spruce Fir are renewed in those countries, the White Pine should be introduced; it will be easy to decide whether it can be successfully naturalized.

PLATE CXLV.

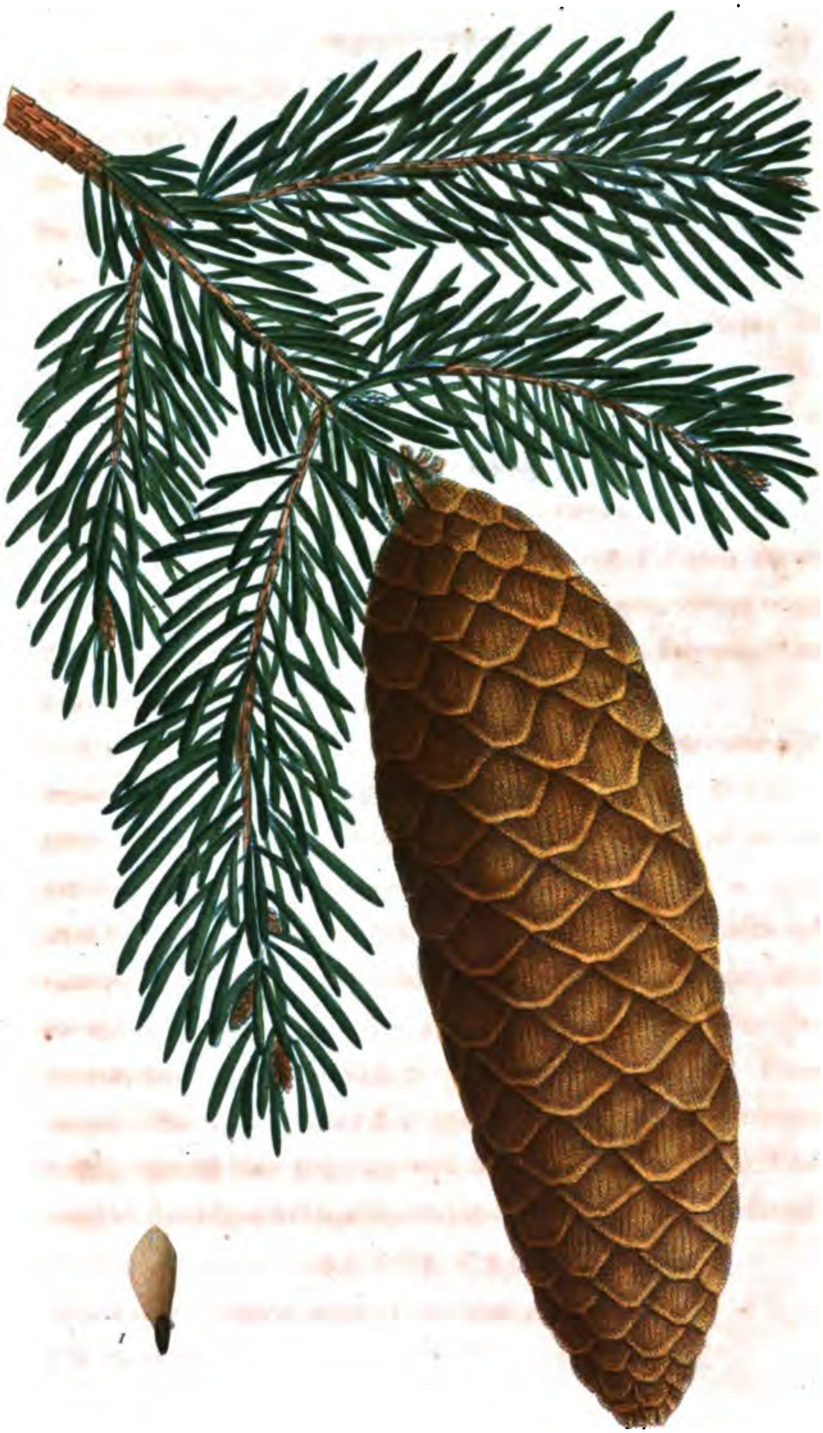
A branch with a cone of the natural size. Fig. 1, *A leaf. Fig.* 2, *A seed.*

NORWAY SPRUCE FIR.

Abies picea. *A. arbor excelsa; foliis solitariis, subtetragonis, subulatis; strobilis cylindraceis, pendulis; squamis rhombeis, planis; margine repandis, erosis.*

The Norway Spruce Fir, like the Wild Pine, is indigenous to the northern climates of Europe and Asia, and becomes rare in descending towards the South. In France, Italy and Spain, it abounds only among the mountains, in deep vallies, and on declivities exposed to the north.

This is one of the tallest trees of the Old Continent: it is straight-bodied, from 120 to 150 feet in height, and from 3 to 5 feet in diameter, and is a hundred years in acquiring its growth. Its dark foliage gives it a funereal aspect, which is rendered more gloomy by the declining of its branches towards the earth. The limbs, as in the American Spruces, are verticillate, and spring from a common centre. The leaves are longer, but less numerous, than those of the American species, and are slightly arched, firm and acute. The flowers form red aments at the extremity of the upper branches, and are succeeded by reddish, cylindrical cones, 5 or 6 inches long and 15 or 18 lines in diameter, containing small winged seeds, which are ripe towards the end of November.



Bessa del. Gabriel sculp.

Norway Spruce Fir.

Abies picea.

The wood is essentially different from that of the Wild Pine, being whiter, far less impregnated with resin, and consequently lighter, to which is added greater elasticity. The union of these qualities renders it peculiarly proper for the yards of large ships. Besides this important use, it is much employed in England in joinery, and is called among workmen *white deal.* It is brought principally from Norway, and forms a large proportion of the commerce of that country in wood, which exceeds a million and a half of dollars annually. In the north of Europe its bark is frequently substituted for that of the Oak in tanning. A resinous substance, less fluid than that of the Pines, distils between the bark and the trunk, which is mixed with lamp-black and used by shoe-makers.

The Norway Spruce Fir is attacked, like the Wild Pine, by the insect *Bostrichus piniperda,* which makes such havock of the resinous trees.

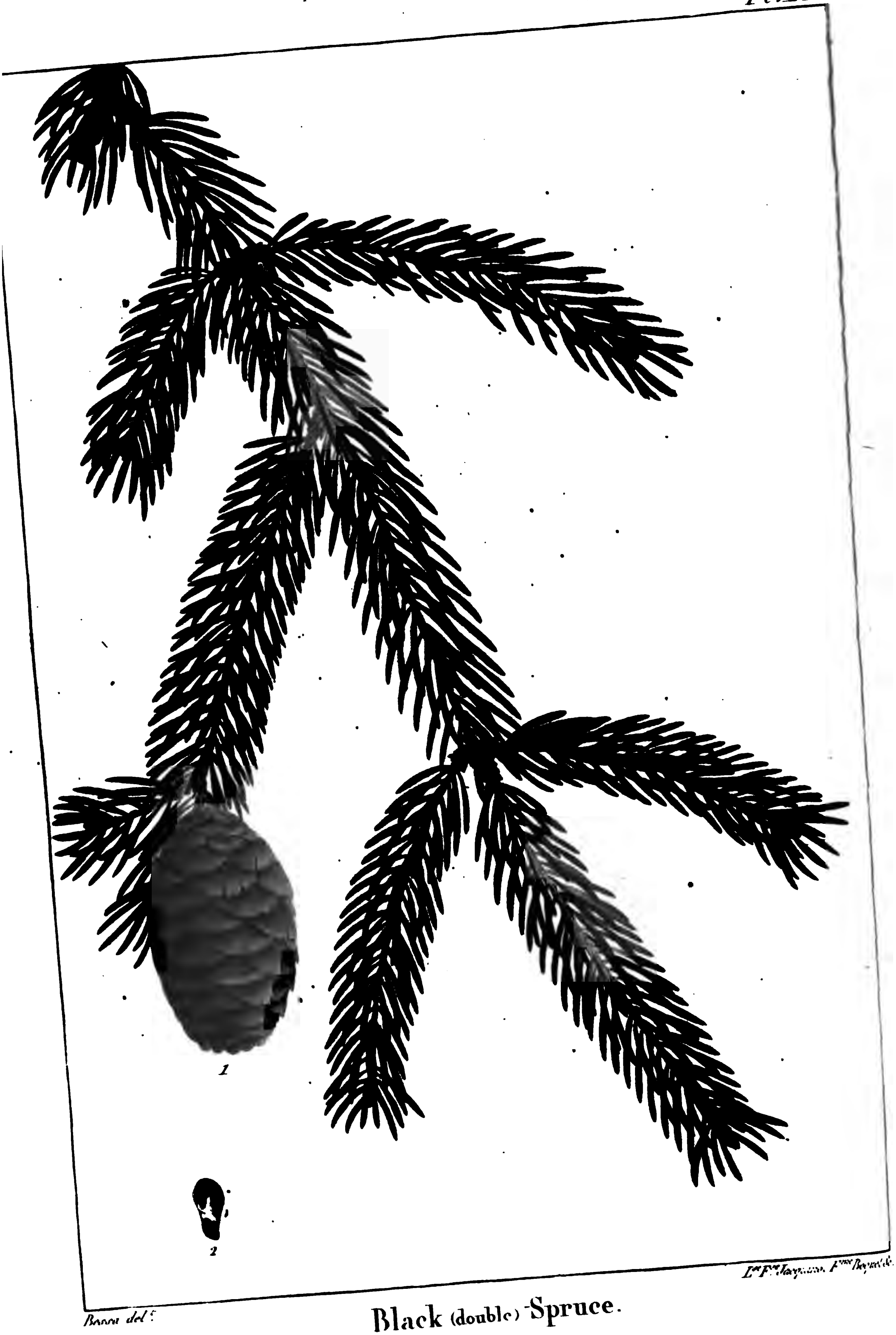
The extensive use of this wood in Germany has caused great attention to be paid to the forming and preserving of forests. The plantation is begun by thoroughly loosening the ground in the month of March, and the seed is mixed, in the proportion of one sixth, with oats.

The wood of the Norway Spruce is not superior to that of the Black Spruce, but in my opinion the European species would be preferable for the northern parts of America.

Observation. A variety of this species is said to exist, called *Long Cornish Fir*, of which the cones are much larger.

PLATE CXLVI.

A branch with a cone of the natural size. Fig. 1, *A seed.*



Bessa del.t

L.re F.re Jacquin, F.me Bequet sc.

Black (double) Spruce.

Abies nigra.

BLACK OR DOUBLE SPRUCE.

Abies nigra. *A. arbor maxima; foliis solitariis undique circa ramos erectis, brevioribus, subtetragonis; strobilis ovatis, pendulis; squamis subundulatis, apice crenulatis aut divisis.*

This tree, which appertains to the coldest regions of North America, is called *Epinette noire* and *Epinette à la bière* in Canada, *Double Spruce* in the District of Maine, and *Black Spruce* in Nova Scotia, though the two last denominations are known throughout all these countries. I have preferred that of Black Spruce, which expresses a striking character of the tree, and is contrasted with that of the following species, the *White Spruce.* From the influence of the soil upon the wood it is sometimes called *Red Spruce,* and this variety has been considered, mistakenly as I shall prove in the sequel, as a distinct species.

The Black Spruce is most abundant in the countries lying between the 44th and 53d degrees of latitude, and between the 55th and 75th degrees of longitude, viz: Lower Canada, Newfoundland, New Brunswick, Nova Scotia, the District of Maine, Vermont and the upper part of New Hampshire; and it is so multiplied as often to constitute a third part of the forests by which they are uninterruptedly covered. Farther south it is rarely seen except in cold and humid situations on the top of the Alleghanies. It is particularly remarked in a large swamp not far from Wilksberry in Pennsylvania, and on the Black Mountain in South Carolina, which is one of the loftiest summits of the Southern States, and is probably thus named from the melancholy aspect occasioned by the dusky foliage of this tree. It is sometimes met with also in the White Cedar swamps near Philadelphia and New York; but in these places, which are always miry and sometimes submerged, its vegetation is feeble. The leaves are of a dark, gloomy green, about 4 lines long, firm, numerous, and attached singly over the surface of the branches. The flowers appear at the extremity of the highest twigs, and are succeeded by small, reddish, oval cones, pointing towards the earth, and varying in length from 8 lines to 2 inches. They are composed of thin scales, slightly notched at the base, and sometimes split for half their length on the most vigorous trees, on which the cones are also the largest: they are not ripe till the end of autumn, when they open for the escape of the seeds, which are small, light, and surmounted by a wing, by means of which they are wafted abroad by the wind.

The regions in which the Black Spruce is the most abundant are often diversified with hills, and the finest forests are found in vallies where the soil is black, humid, deep, and covered with a thick bed of moss: though crowded so as to leave an interval of only three, four or five feet, these stocks attain their fullest developement, which is 70 or 80 feet in height and from 15 to 20 inches in diameter. The summit is a regular pyramid, and has a beautiful appearance on insulated trees. This agreeable form is owing to the spreading of the branches in a horizontal instead of a declining direction, like those of the true Norway Pine, which is a more gloomy tree.

The trunk, unlike that of the Pines, is smooth, and is remarkable for its perpendicular ascension and for its regular diminution from the base to the summit, which is terminated by an annual shoot 12 or 15 inches long. It is found in the same countries on the declivities of mountains, where the soil is stony, dry, and covered only with a thin bed of moss; but as this soil is less favourable, its growth is less luxuriant and its stature less commanding. The same observation is applicable to other tracts designated by the name of *poor black lands*, which are meager spots covered with the Black Spruce. In these situations it has shorter, thicker leaves of a still darker colour, with cones only half as large, but similar in form and ripe at the same period.

I shall frequently have occasion to observe that the inhabitants of the country, and mechanics who work in wood, take notice only of certain striking appearances in forest trees, such as the quality of the wood, its colour and that of the bark; and that, from ignorance of botanical characters, they give different names to the same tree, according to certain variations in these respects arising from local circumstances. To this cause must be attributed the popular distinction of Black and Red Spruce. Sir A. B. Lambert, misled by the remarkable size of the cones of the last variety which have been sent to England, and by incorrect information, determined, with some hesitation, to describe and figure it under the name of *Abies rubra:* he represents it as inferior in every respect to the Black Spruce, though, according to my own observations in the country where it grows, it unites in the highest degree all the good qualities which characterize the species. Samples of the heart would probably have confirmed his opinion that they are distinct species; for that of the Black Spruce is white, and that of the other variety reddish. But I repeat that this difference in the wood of trees of the same species is produced only by the influence of soil.

The distinguishing properties of the Black Spruce are strength, lightness and elasticity. Josselyn, in his *History of New England,* published in London in 1672, informs us that it was considered at that period as furnishing the best yards and topmasts in the world. Besides possessing these qualities, as we have already observed, in a higher degree, the Red Spruce is superior in size to the other variety, which grows in a poorer soil, and is less supple and more liable to be crooked.

In the dock-yards of the United States the spars are usually of Black Spruce from the District of Maine, and for the same purpose it is exported in great quantities from Maine, New Brunswick and Nova Scotia to the West Indies and to Liverpool.

Oddy says that in England it is preferred to the Norway Pine, *Abies picea,* but that it does not afford pieces of sufficient dimensions for the yards of men of war, which are made of the Norway Pine or of the White Pine.

The *knees* of vessels are frequently of Black Spruce in the District of Maine, and sometimes at Boston, where the Oak is becoming rare. When these pieces are of Oak, they are formed of two limbs united at the base; but when of Spruce, they are made from the base of the trunk and one of the principal roots. From its strength and durability this species is the most proper substitute for the Oak and the Larch which is also rare in the northern parts of the United States. In Maine and at Boston it is often employed for the rafters of houses, and is more esteemed than the Hemlock Spruce, which was formerly preferred. Some persons select it for floors; it is tougher than the White Pine, but more liable to crack.

In all these regions, and particularly in Maine and New Brunswick, the Black Spruce is sawn into boards of considerable width, which are sold a fourth cheaper than those of White Pine. They are exported to the

West Indies and to England, and I have been informed that a large part of them are consumed at Manchester and Birmingham in packing goods. The supply I doubt not will long be abundant, for the species is a hundred times more multiplied than the White Pine. In Nova Scotia the Red Spruce, which is straight-grained and more easily wrought, is employed for barrels to contain salted fish. This species is not resinous enough to afford turpentine as an article of commerce. The wood is filled with air, and snaps in burning like Chesnut.

With the young branches, especially those of the Black Spruce, is made the salutary drink known by the name of *spruce beer,* which in long voyages is found an efficacious preventive of the scurvy. The twigs are boiled in water, a certain quantity of melasses or maple sugar is added, and the mixture is left to ferment. The essence of spruce is obtained by evaporating, to the consistence of an extract, water in which the summits of the young branches have been boiled. As I have never seen the operation performed, I cannot describe its details; but I have often witnessed the process of making the beer in the country about Halifax and in Maine, and can affirm with confidence that it is not, as Sir A. B. Lambert asserts, the White Spruce which is used for this purpose.

If the wood of this species has in fact been proved in England to be superior to that of the Norway Pine, it would be useful to propagate it on the Old Continent;

but in my opinion it would flourish only in the coldest and most humid countries of the north of Europe, and on some parts of the Alps, the Pyrenees, and the Highlands of Scotland.

PLATE CXLVII.

A branch with a cone of the natural size. Fig. 1, *A leaf. Fig.* 2, *A seed.*

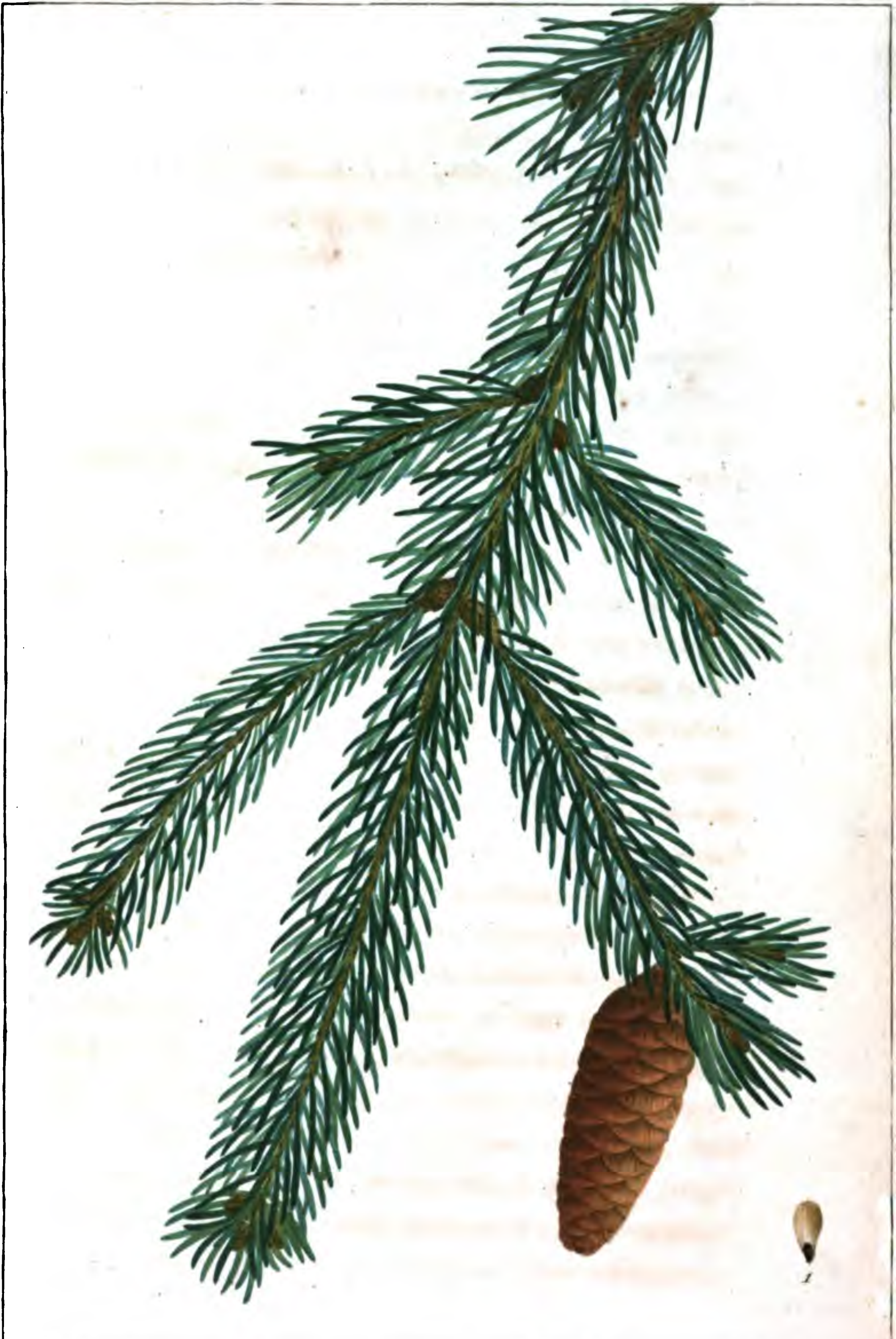
WHITE OR SINGLE SPRUCE.

Abies alba. *A. arbor* 45-50 *pedalis; foliis subglaucis undique circa ramos erectis, tetragonis; strobilis oblongo-cylindraceis, pendulis, laxis; squamis margine integerrimis.*

This species is indigenous to the same countries as the preceding. In Canada it is called *Epinette blanche*, in Nova Scotia *White Spruce*, and in New Brunswick and the District of Maine *Single Spruce*. As the two last denominations are generally known, I have adopted that which appeared to me the best.

The White Spruce commences a few degrees farther south than the species just described. In my father's notes it is first mentioned near lake St. John, between the 48th and 49th degrees of latitude. In the District of Maine, at least in the parts which I have visited, it is much less common than the Black Spruce, and the comparison is easily made, as they are readily distinguished, especially young and insulated stocks. Though the leaves of both encompass the branches, they are marked by several characteristic differences : those of the White Spruce are less numerous, longer, more pointed, at a more open angle with the branches, and of a pale, bluish green; whence is derived the specific name of *alba*. The cones are also peculiar, being of a lengthened oval form, about 2 inches in one direction, and 6 or 8 lines

Pl. 12.



Bessa del.

F.me Bocquet Sc.

White (single) Spruce.

Abies alba.

in the other : the dimensions vary according to the vigour of the tree, but the form is unchangeable. The scales are loose and thin, with entire edges, unlike those of the Black Spruce. The seeds, also, are rather smaller, and are ripe a month earlier.

This species grows in nearly the same situations as the preceding, but it has a more tapering trunk, and is inferior in stature, rarely exceeding 50 feet in height and 12 or 16 inches in diameter at three feet from the ground. Its summit, like that of the Black Spruce, is a regular pyramid, but less branching and tufted. The bark is lighter-coloured, and the difference is more striking upon the young shoots.

The wood is employed for the same uses as the other; it is, however, inferior in quality, and snaps more frequently in burning. The fibres of the roots, macerated in water, are very flexible and tough; being deprived in the operation of their pellicle, they are used in Canada to stitch together the canoes of Birch bark, the seams of which are afterwards smeared with a resin, improperly called *gum,* that distils from the tree.

Sir A. B. Lambert asserts that the bark is employed in tanning; this may possibly be true in Lower Canada and Newfoundland, which I have not visited, but it is never done in Maine, New Brunswick and Nova Scotia. The branches are not used for beer, because the leaves when bruised diffuse an unpleasant odour, which they are said to communicate to the liquid.

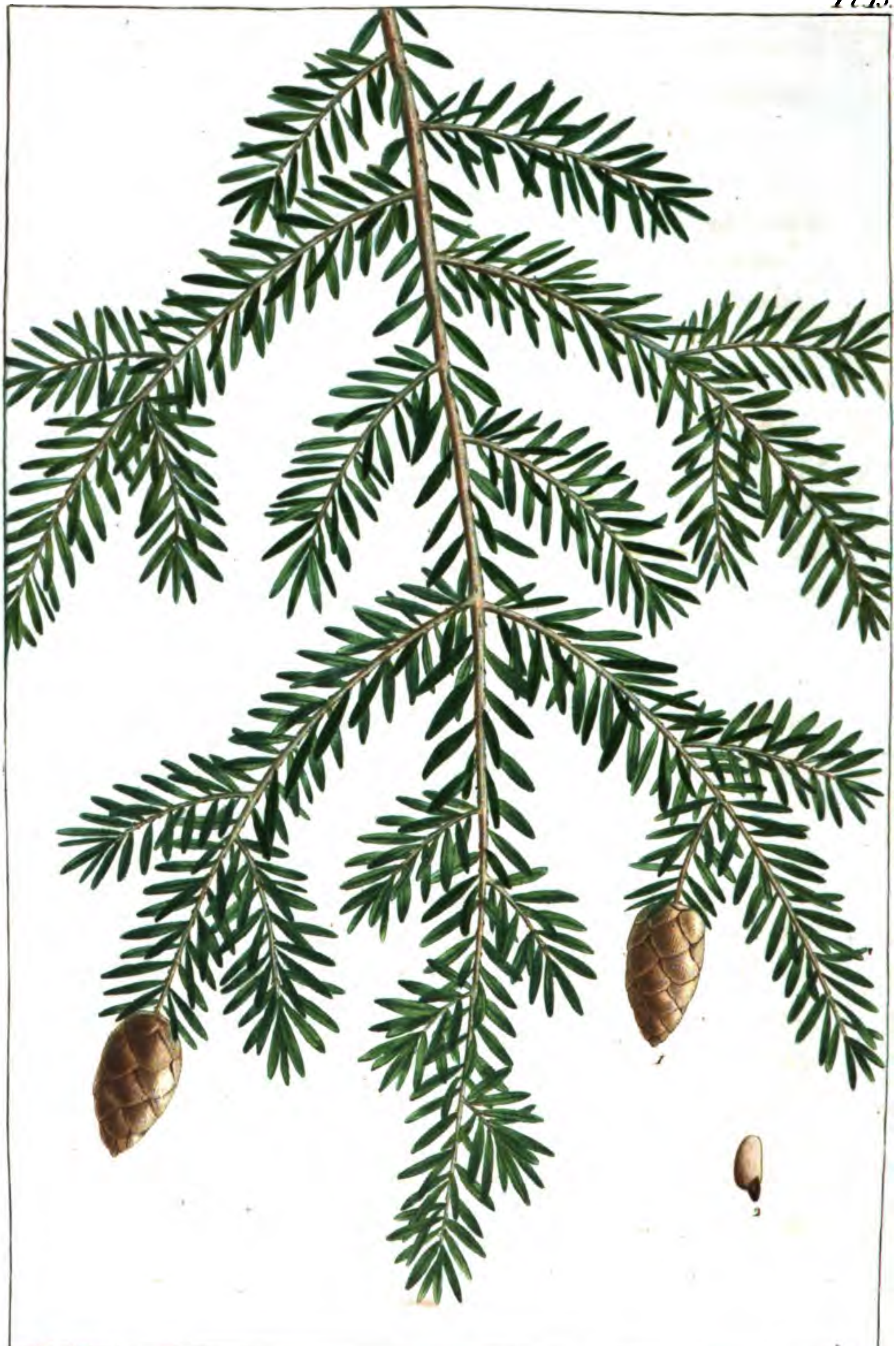
This species is much more common in France than the Black Spruce. It is an elegant tree while young, and as it forms an agreeable contrast with the darker foliage of the other Spruces, it is esteemed a valuable ornament for parks and gardens.

Nurserymen in France and Germany distinguish two varieties, the White or Silver Spruce and the Blue Spruce.

PLATE CXLVIII.

A branch with a cone of the natural size. Fig. 1, *A leaf. Fig.* 2, *A seed.*

Pl. 13.



Henry Redouté del.

Bessin Sculp.

Hemlock Spruce.

Abies canadensis.

HEMLOCK SPRUCE.

Abies canadensis. *A. arbor maxima; ramis gracilibus; ramulis novellis villosissimis; foliis solitariis, planis, subdistichis; strobilis terminalibus, minimis, ovatis, despicientibus.*

The Hemlock Spruce is known only by this name throughout the United States, and by that of *Pérusse* among the French inhabitants of Canada. It is natural to the coldest regions of the New World, and begins to appear about Hudson's Bay, in latitude 51°; near lake St. John and in the neighbourhood of Quebec it fills the forests, and in Nova Scotia, New Brunswick, the District of Maine, the State of Vermont and the upper part of New Hampshire, where I have observed it, it forms three quarters of the evergreen woods, of which the remainder consists of the Black Spruce. Farther south it is less common, and in the Middle and Southern States is seen only on the Alleghanies; even there it is often confined to the sides of torrents and to the most humid and gloomy exposures.

In the country east and north of Massachusetts, which, without embracing Canada, is more than 750 miles long and about 250 miles broad, the resinous trees are constantly found at the foot of the hills, and constitute nearly half of the unbroken forests which cover these regions. Hence we may conceive how extensively this species is multiplied.

Moist grounds appear not to be in general the most favourable to its growth; when mingled with the Black Spruce it predominates less as the soil is more humid, and I have often seen large stocks among the Beeches and Sugar Maples on soils proper for corn.

The Hemlock Spruce is always larger and taller than the Black Spruce; it attains the height of 70 or 80 feet, with a circumference from 6 to 9 feet, and uniform for two thirds of its length. But if the number and distance of the concentrical circles afford a certain criterion of the longevity of trees and the rapidity of their vegetation, it must be nearly two centuries in acquiring such dimensions.

The leaves are 6 or 8 lines long, flat, numerous, irregularly disposed in two ranks, and downy at their unfolding. The cones are a little longer than the leaves, oval, pendulous, and situated at the extremity of the branches. In a favourable soil this tree has an elegant appearance while less than 30 feet high, owing to the symmetrical arrangement of its branches and to its tufted foliage, and at this age it is employed in landscape gardening. When arrived at its full growth, the large limbs are usually broken off 4 or 5 feet from the trunk, and the dried extremities are seen staring out through the little twigs which spring around them. In this mutilated state, by which it is easily recognized, it has a disagreeable aspect, and presents, while in full vigour, an image of decrepitude. This accident, which is attributed to the snow lodging upon the close, horizontal, tufted branches, never happens to the young trees, whose fibres are more flexible. The woods are also filled with dead stocks, but I am unable to say whether their destruction is occasioned by an insect which attaches itself of preference to the Pines, or to some other cause. The dead moss-grown trees, which stand mouldering for twenty or thirty years, deform the forests of this part of the United States, and give them a gloomy and desolate appearance.

The Hemlock Spruce is distinguished by the peculiarity of sometimes ceasing to grow at the height of 24 or 30 inches. In this state it has a pyramidical shape, and its compact, tufted branches adhere to the ground. It might be employed to form hedges and to decorate gardens in place of the Yew, to which it is preferable for the superior rapidity of its growth and the sprightlier tint of its foliage, while it suffers the pruning-hook with equal security : this remark I made while observing the Spruces upon an open, dry, stony spot between Portland and York.

Unhappily the properties of its wood are such as to give this species only a secondary importance, notwithstanding its abundant diffusion : it is the least valuable in this respect of all the large resinous trees of North America. But the regret which we should experience to see it occupying so extensively the place of more useful species, is forbidden by a property of its bark inestimable to the country where it grows, that of being applicable in tanning.

It is esteemed an excellence in wood to split in a straight line, which it does when the fibre is vertical: that of the Hemlock Spruce is so oblique that it makes the circuit of stocks 15 or 20 inches in diameter in ascending 5 or 6 feet. Besides this defect, which is essential and which renders it unfit for rural fence, the old trees frequently have the concentrical circles separated at intervals, or, in the language of the country, are *shaky*, which greatly impairs their strength. This effect is produced by the winds, which have a powerful hold upon a large, compact summit, exposed above the heads of the surrounding trees. It is found to decay rapidly when open to the atmosphere, and is therefore improper for the external covering of houses, which is another important defect in a country where nearly all the houses are of wood. But as the White Pine becomes rarer this species is substituted for it as extensively as possible : it is firmer, though coarser grained, affords a tighter hold to nails, and offers more resistance to the impression of other bodies; for this reason it is employed in the District of Maine, in the form of two-inch planks, for threshing floors. But the most common use, in which great quantities of it are consumed in the Northern States, is for the first sheathing of wooden houses, which are afterwards covered with *clap-boards* of White Pine. For economy the interior frame is sometimes made of Hemlock Spruce, and it is found, when guarded from humidity, to be as durable as any other species. It is always chosen for the lathes of the interior walls, and is exported in this form to England. In the District of Maine it is usually taken for the posts of rural fence, which last about 15 years, and are preferable to those of Grey and Red Oak. It contains little resin, and I have found the trunk but slightly coated with turpentine where large pieces of bark had been removed long before.

I have already observed that this bark is a substitute for that of the Oaks in the preparation of leather. It is taken from the tree in the month of June, and half the epidermis is shaved off with a plane before it is thrown into the mill. From the District of Maine it is exported to Boston, Providence, etc., and is almost exclusively employed in the *tan-yards*. It is brought to New York from the upper parts of the Hudson, and is sometimes carried to Baltimore. Its deep red colour is imparted to the leather, and I have been informed by tanners that it is inferior to Oak bark, but that the two species united are better than either of them alone. Hemlock Spruce bark was once exported to England, but the commerce has ceased with the demand. The Indians are said to use it in dying their light baskets made of Red Maple.

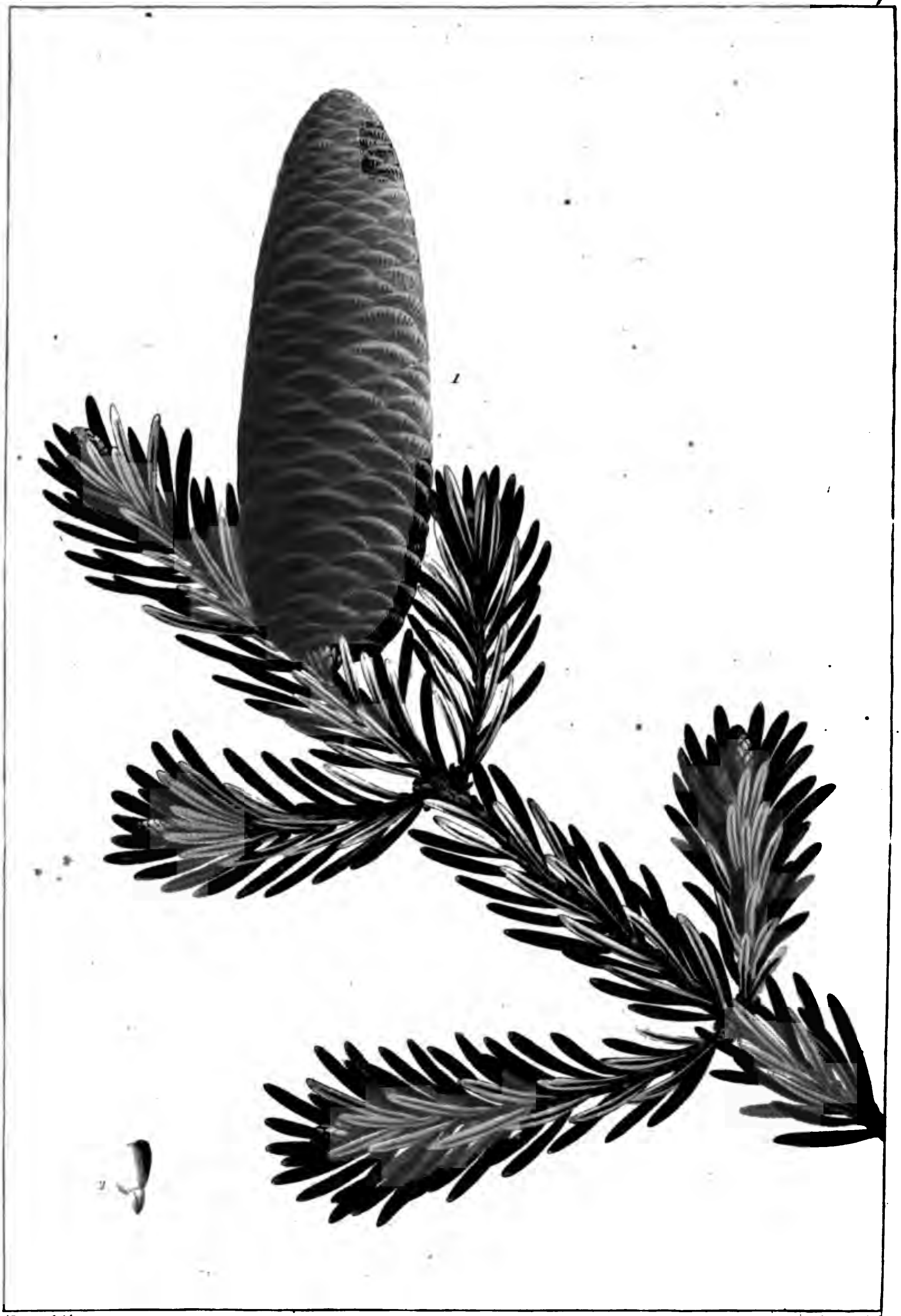
This species yields seed in many gardens of France, England and Germany; but in France its vegetation is not luxuriant, because it is usually planted in situations too open and dry. It offers no inducement to propagate it in Europe.

The figure in Sir A. B. Lambert's work is correct, but he repeatedly errs in the brief description annexed, and takes no notice of the peculiar property of the bark.

PLATE CXLIX.

A branch with cones of the natural size. Fig. 1, *A seed.*

Pl. 14.



Bessa del.t Bouvin Sculp.

American Silver Fir.

Balsam or of Gilead.

Abies balsamifera.

AMERICAN SILVER FIR.

ABIES BALSAMIFERA. *A. arbor 40-45 pedalis; foliis solitariis, subtus argenteis, apice emarginatis integrisve, subrecurvo-patentissimis; strobilis cylindraceis, violaceis, sursum spectantibus.*

THE coldest regions of North America are the native country of this species of Spruce. In the United States, Canada and Nova Scotia, it is called *Silver Fir, Fir Balsam*, and *Balsam of Gilead.*

From the observations of Messrs. Titus Smith, estimable botanists who have explored Nova Scotia and with whom I became acquainted at Halifax, by those of my father who visited Canada, and by my own, the Silver Fir appears not to constitute masses of woods, but to be disseminated, in greater or less abundance, among the Hemlock and Black Spruces. Farther south it is found only on the summit of the Alleghanies, and particularly on the loftiest mountains of North Carolina. Its height rarely exceeds 40 feet, with a diameter of 12 or 15 inches. This statement is confirmed by the persons whom I have just cited; and Vanghenheim, who never travelled in these countries, and after him Sir. A. B. Lambert, mistakenly assert that it is a tree of elevated stature. The body tapers from a foot in diameter at the surface of the ground to 7 or 8 inches at the height of

6 feet. When standing alone and developing itself naturally, its branches, which are numerous and thickly garnished with leaves, diminish in length in proportion to their height, and form a pyramid of perfect regularity. The leaves are 6 or 8 lines long, and are inserted singly on the sides and on the top of the branches; they are narrow, rigid and flat, of a bright green above and a silvery white beneath; whence probably is derived the name of the tree.

The cones are nearly cylindrical, 4 or 5 inches long, an inch in diameter, and always directed upwards; this last characteristic, which belongs also to the Silver Fir of Europe, distinguishes these species from the *Epicias*, whose cones are turned towards the earth.

The wood of the Silver Fir is light and slightly resinous, and the heart is yellowish. In Maine, where it chiefly abounds, it is not employed on account of its deficiency of size or of strength. I was informed by Messrs. Smith, that in Nova Scotia it sometimes serves for the staves of casks used in packing fish; but for this purpose the White Pine and Yellow Spruce are commonly preferred.

The resin of the Pines is extracted by means of incisions in the body of the tree, at which it exudes from the pores of the bark and from the sap-vessels of the alburnum: in the American and European Silver Firs this substance is naturally deposited in vesicles on the trunk and limbs, and is collected by bursting these tumours and receiving their contents in a bottle: only a few bottles are annually obtained in Canada, the District of Maine and the adjacent countries. It is sold in England and the United States under the name of *balm of Gilead,* though every body knows that the true balm of Gilead is produced by the *Amyris gileadensis,* a very different vegetable and a native of Asia: perhaps the name has been borrowed in consequence of some resemblance between the substances in taste and smell. The fresh turpentine is a greenish transparent fluid of an acrid penetrating taste; given inconsiderately it produces heat in the bladder, and applied to wounds it causes inflammation and acute pains. It has been highly celebrated in England, and is recommended in certain stages of the pulmonary consumption; in these cases it is preferred to the resin of the European Silver Fir, which is collected in a similar manner in Switzerland and in some parts of Germany.

This tree has been long cultivated in Europe, but it must be reserved for the embellishment of pleasure grounds, where its regular form and agreeable foliage give it a distinguished place among evergreen trees.

The Silver Fir of Europe is so analogous to that of America, that it is unnecessary to describe it; the only difference is that it has longer leaves and bigger cones, and attains a much greater elevation; according to M. Burgsdorf, grand-forester of Prussia, it is sometimes 150 feet high and 6 feet in diameter. The wood of the two species is similar in its general character, and though the advantage is on the side of the Silver Fir of Europe, it is still inferior to the Norway Spruce Fir, which is the more to be regretted on account of its size.

PLATE CL.

A branch with a cone of the natural size. Fig. 1, *A seed.*

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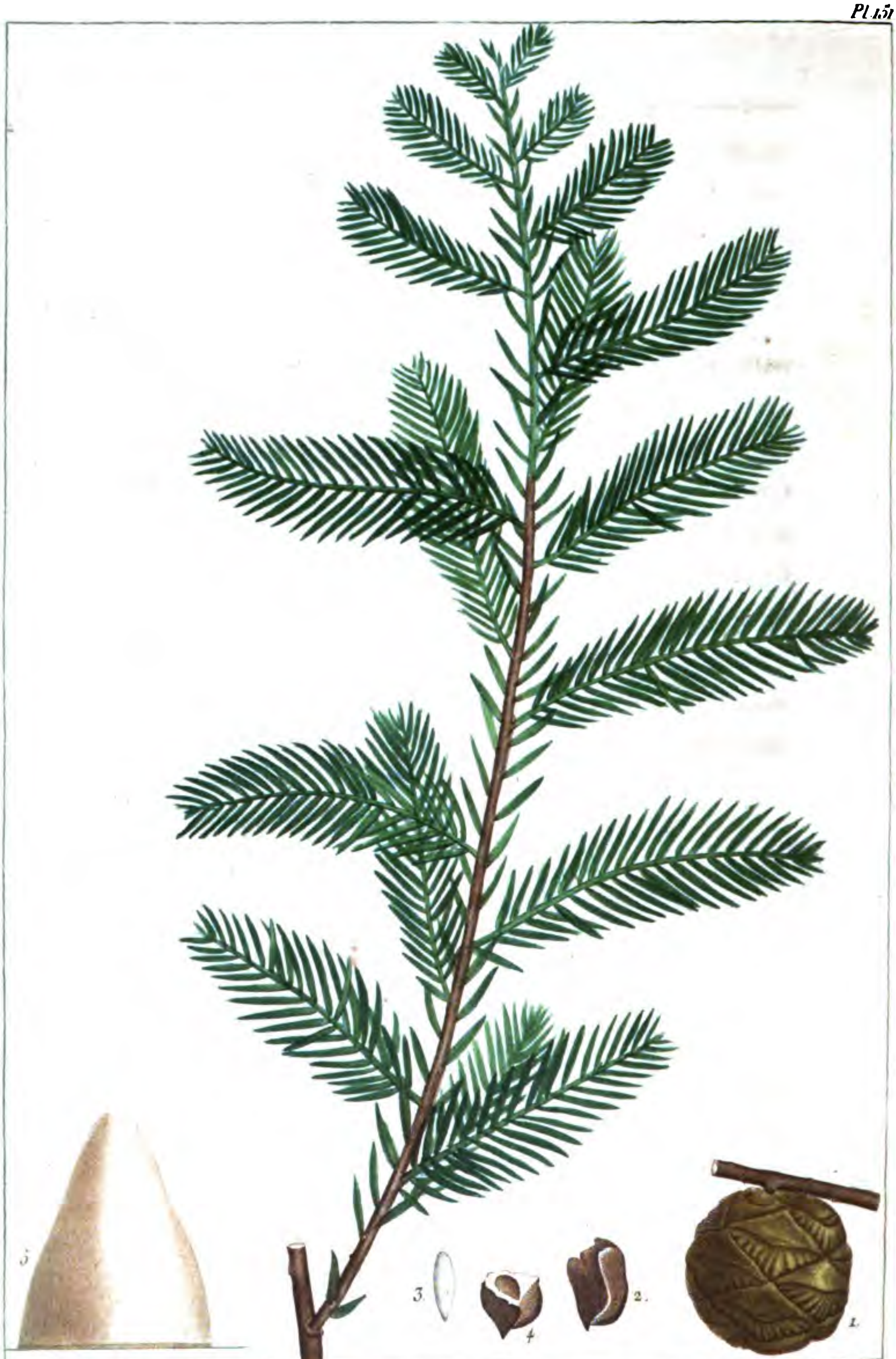
White or Single Spruce.	*Abies alba.*	182
Hemlock Spruce.	*Abies canadensis.*	185
American Silver Fir.	*Abies balsamifera.*	191

Pl. 151



Bessa del

Gabriel sculp

Cypress.

Cupressus disticha.

CYPRESSES.

THE researches of botanists have made us acquainted with only seven species of Cypress, of which two belong to the New Continent and are indigenous to the United States. Among the exotic species, the Pyramidical Cypress, *Cupressus fastigiata*, deserves attention in the Southern States. This tree has been celebrated from antiquity for the excellence of its wood and the singularity of its form. From the gloomy appearance of its tufted branches compressed about the trunk and charged with dark, impenetrable foliage, it was consecrated to funeral solemnities, and planted about temples and tombs.

" The Pyramidical Cypress, originally from Crete, is 30 or 40 feet in height, smooth, and free from the defect observed in the Virginian Cedar, of cracking at the insertion of the limbs. The wood is hard, odoriferous, of an uniform texture and a brilliant red complexion. Pliny affirms that it is very durable, and that its colour is unchangeable: *Cariem vetustatemque non sentit Cupressus.... Materiæ nitor maximè valet æternus.* PLIN: lib. 16, cap. 40. Formerly the rarest and most precious objects were preserved in boxes of Cypress, and we are informed that the doors of St. Peter's at Rome, which had lasted 1200 years, from Constantine to Eugene IV, were of this wood. It is also employed for tables, musical instruments and the tubes of organs. The fruit, which is known by the name of *Cypress nut*, is employed in medicine as an astringent; and Pliny assures us that the leaves pounded and mingled with seeds preserve them from worms.

The Cypress is multiplied from the seed, which is the best method; by layers and by slips. In the beginning of spring the seeds are sown and lightly covered in vessels filled with mould and sand. The young plants must be kept in the shade and protected from the frost. To obtain good seed, Duhamel says that in March or April we should select the cones which begin to open, and store them in a dry place; the seeds which fall out are the best; those which are obtained by opening the cones very rarely germinate." — *Desfontaines, Hist. des Arb. et Arbriss. tom.* 2, *p.* 567.

CYPRESS.

Monœcia monadelphia. Linn. Coniferæ. Juss.

Cupressus disticha. *C. foliis planis, quasi pinnatim distichis, deciduis; floribus masculis aphyllò-racemosis; strobilis subgloboso-ovoïdeis.*

This species is the most interesting of its genus for the varied applications of its wood and for its extraordinary dimensions in a favourable soil and climate. In Louisiana it is called *Cypre* or *Cyprès*, and in the ancient Southern States Cypress, and sometimes Bald Cypress. The names of Black and White Cypress, in the Carolinas and Georgia, are founded only on the quality and colour of the wood.

The banks of Indian river, a small stream that waters a part of Delaware in latitude 38° 50′, may be assumed as its northern boundary. Hence, in proceeding southward, it becomes constantly more abundant in the swamps; but in Maryland and Virginia it is confined to the vicinity of the sea, where the winter is milder and the summer more intense. Beyond Norfolk its limits coincide exactly with those of the *pine-barrens*, and in the Carolinas and Georgia it occupies a great part of the swamps which border the rivers after they have found out their way from among the mountains and have entered the low lands.

East Florida, which I have visited, is similar in its aspect to the maritime parts of the Southern States, except that the soil is in general more uniform; hence the Long-leaved Pine and the Cypress are accompanied by a smaller variety of trees, and are consequently more abundant, the one on the low grounds and the other on the uplands.

The Mississippi, from its mouth to the river of the Arkansas, a distance, in following its windings, of more than 600 miles, is bordered with marshes, which, at the annual overflowing of this mighty stream, form a vast expanse of waters. In Louisiana those parts of the marshes where the Cypress grows almost alone are called *Cyprières,* Cypress swamps, and they sometimes occupy thousands of acres. As in the Floridas the swamps are contiguous to immeasurable plains covered with Pines, or oftener with tall grass mingled with other plants. In the midst of these Pine forests and savannas is seen here and there a bog or a plash of water filled with Cypresses, whose squalid appearance, when they exceed 18 or 20 feet in height, proves how much they are affected by the barrenness of a soil which differs from the surrounding waste only by a layer of vegetable mould a little thicker upon the quartzous sand. From these particulars a sufficiently just idea may be formed of the geographical situations and of the soil in which the Cypress is found, over an extent of more than 1,500 miles, from its first appearance towards the north to the Mississippi : towards the south-west my information does not reach beyond Louisiana, though I have some reason to believe that it is seen as far as the mouth of the river *Del Norte*, latitude [illegible]6°, which, if we measure the circuit of the Gulf of Mexico, makes a distance of more than 3000 miles.

M. de Humboldt, in his interesting account of New Spain, mentions several trees of this species in the ancient gardens of the Emperor of Mexico, which were planted before the arrival of the Spaniards, and are now of considerable size.

In the swamps of the Southern States and the Floridas, on whose deep miry soil a new layer of vegetable mould is every year deposited by the floods, the Cypress attains its utmost developement. The largest stocks are 120 feet in height, and from 25 to 40 feet in circumference at the conical base, which, at the surface of the earth, is always three or four times as large as the continued diameter of the trunck : in felling them the negroes are obliged to raise themselves upon scaffolds five or six feet from the ground. The base is usually hollow for tree quarters of its bulk, and is less regularly shaped than that of the Large Tupelo. Its surface is longitudinally furrowed with deep channels, whose ridges serve as cramps to fix it more firmly in the loose soil. The roots of the largest stocks, particularly of such as are most exposed to inundation, are charged with conical protuberances, commonly from 18 to 24 inches, and sometimes from 4 to 5 feet in thickness : they are always hollow, smooth on the surface, and covered with a reddish bark like the roots, which they resemble, also, in the softness of their wood : they exhibit no signs of vegetation, and I have never succeeded in obtaining shoots by wounding their surface and covering them with earth. No cause can be assigned for their existence; they are peculiar to the Cypress, and begin to appear when it is 20 or 25 feet in height : they are made use of only by the negroes for bee-hives. The summit of the Cypress is not pyramidical like that of the Spruces, but is widely spread and even depressed upon old trees. The foliage is open, light, and of a fresh agreeable tint, each leaf is 4 or 5 inches long, and consists of two parallel rows of leaflets upon a common stem. The leaflets are small, fine, and somewhat arching, with the convex side outwards. In the autumn they change from a light green to a dull red, and are shed soon after. Boiled during three hours in water they afford a fine durable cinnamon colour; such at least has been the result of several experiments made in Europe.

The Cypress blooms in Carolina about the firts of February. The male and female flowers are separately borne by the same tree, the firts in flexible pendulous aments, and the second in bunches scaacely apparent. The cones are about as large as the thumb, hard, round, of an uneven surface, and stored with small, irregular ligneous seeds, containing a cylindrical kernel : they are ripe in October, and retain their productive virtue for two years.

The wood is fine-grained, and, after being for some time exposed to the light, of a reddish colour: it possesses great strength and elasticity, and is lighter and less resinous than that of the Pines. To these properties is added the faculty of long resisting the heat and moisture of the southern climate. The colour of the bark and the properties of the wood vary with the nature of the soil; the stocks which grow near the natural bed of the rivers, and are half the year surrounded with water to the height of three or four feet, have a lighter coloured bark than those which stand retired in places which the waters do not reach, or where they sojourn but a moment. The wood, also, is whiter, less resinous and less heavy. These are called *White Cypresses.* The others, of which the bark is browner and the wood heavier, more resinous, and of a duskier hue, are called *Black Cypresses.* When destined to be employed in the arts, both varieties should be felled in the winter, and kept till, by a long process, the wood has become perfectly dry. A resin of an agreeable odour and a red colour exudes from the Cypress; it is not abundant enough to be collected for commerce, though more copious than that of the White Cedar, which is probably the reason of the wood's being denser and stronger: the negroes prefer it to that of the Pines as a dressing for suppurating wounds.

This wood is more generally employed in Louisiana than in any other part of the United States : it is profitably substituted for the White Oak and the Pine, which are rare, and it is proved to be twice as durable as the Pine. Nearly all the houses in New Orleans are still of wood, and the frame, the interior work and the outer covering are of Cypress. It was almost as generally employed in Georgia and the Carolinas soon after their settlement; but it is now replaced by other species, as all the large stocks have been consumed in the populous districts: near the swamps, where it abounds, the houses are still built, or at least covered, with it. Of whatever materials the building is constructed in these States, the roof is universally covered with Cypress shingles, which, if made from trees felled in the winter, last forty years. They are split off in a direction parallel to the concentrical circles. At Norfolk in Virginia, near the *Dismal Swamp,* where immense quantities are made both of this species and of White Cedar, those of Cypress are preferred; at Philadelphia and Baltimore, where they are also procured at equal prices, the preference is given to those of White Cedar. This fact seems to support the conclusion that each unites the principles which ensure durability only in the soil and climate in which they respectively abound.

In the towns of the Southern States where the White Pine is cheap it has in a great measure taken place of the Cypress for the interior work of houses; but Cypress boards are still preferred for the inside of brick houses, and for window-sashes and the panels of doors exposed to the weather : cabinet-makers also choose it for the inside of mahogany furniture.

I have been assured that in Louisiana it is found highly proper for the masts and sides of vessels, and it has the same reputation in Charleston and Savannah, though at present it is little employed. Wherever it grows it is chosen for canoes, which are fashioned from a single trunk and are 30 feet long and 5 feet wide, light, solid, and more durable than those of any other tree.

On the banks of the Mississippi it is used to enclose plantations, and posts made of the perfect wood last a long time in the ground. For this last usage it is preferred to every other tree in those districts of Georgia in which it abounds or is easily procured. It makes the best pipes to convey water under ground ; especially the Black Cypress, which is more resinous and solid.

The inexhaustible Cypress-swamps on the Mississippi not only supply materials for every species of building in Lower Louisiana, but furnish for exportation to the West Indies. This branch of commerce, which consisted principally of boards and shingles, has declined within a few years, in consequence of the great exportation from the Northern States of different species of Pine, particularly the White Pine, which are sold at half the price and devoted to nearly the same uses.

At the Havannah the White Pine has generally superseded the Cypress for sugar-cases, for which it was once extensively used; for the covering of houses Cypress shingles are still preferred, and the consumption in the French, English and Danish Colonies is estimated at 100 millions of shingles annually, of which the greater part come from Norfolk, Wilmington and Savannah: more than 15 millions have been brought in a single year from Norfolk, and more than 30 millions from Wilmington. They are 22 or 44 inches long, and from 3 to 6 inches wide: in February 1808, the price of the longest was from 4 to 5 dollars a thousand at Philadelphia, and they usually bear a double price in the West Indies.

Such is, in substance, the information which I have collected concerning a tree of inestimable value to the Southern States, and particularly to Lower Louisiana, which is still more scantily furnished with good timber. If I had visited that State I could have rendered my description more complete; it is still the most detailed and exact that has appeared. To learned amateurs I leave the task of celebrating a tree so important for its uses, and so admirable for the luxuriance of its vegetation and the majesty of its form.

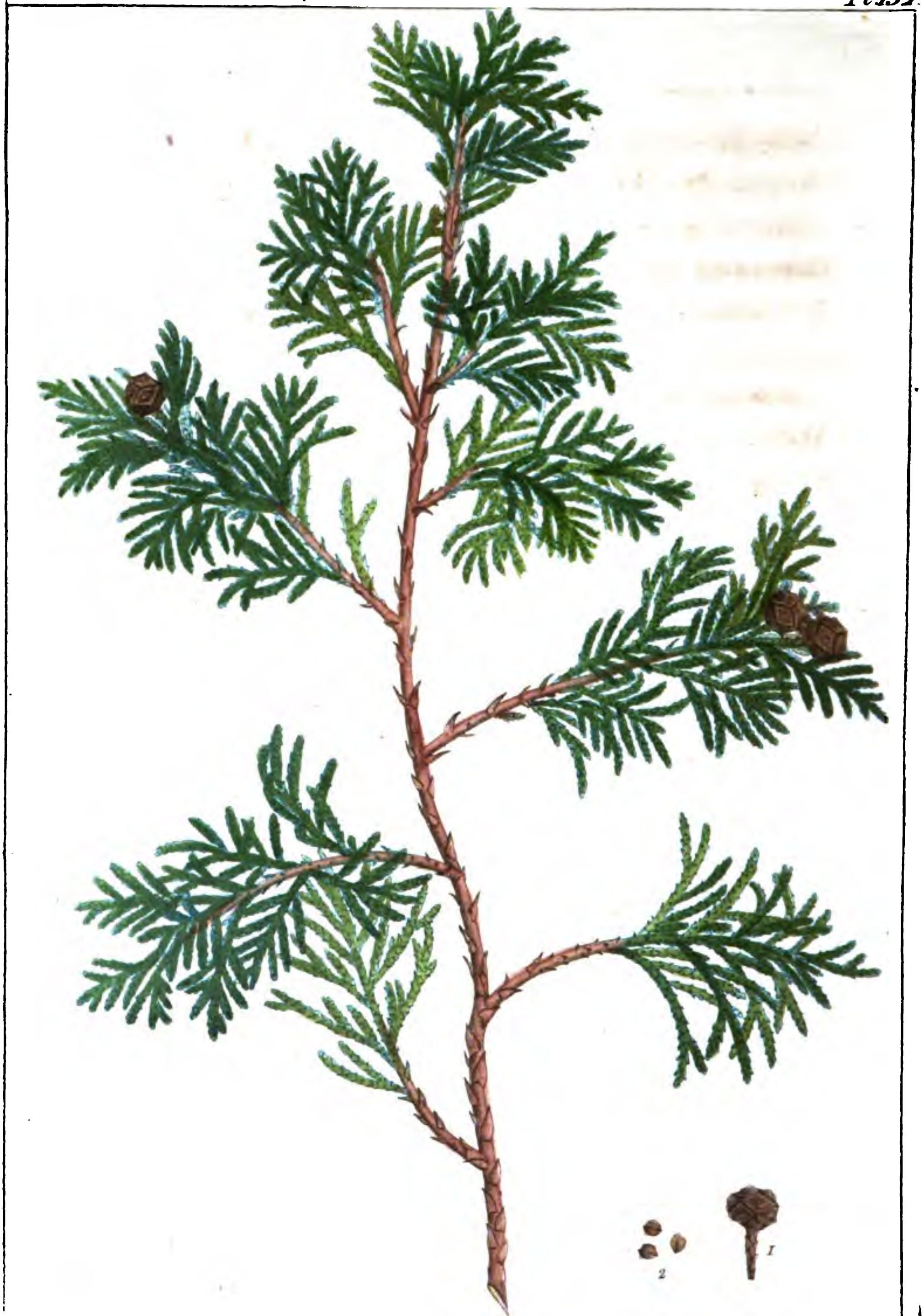
In Europe the patrons of useful culture and ornamental gardening have laboured zealously for more than fifty years to multiply the Cypress. Many of them are of opinion that, as it supports the winter of Paris and even of Belgium and England, it might be profitably planted in many vacant marshes and watery grounds. The warmest praise is due to the intentions with which this plan is recommended, but I cannot fully adopt the sanguine hopes that are entertained of its result: probably it will always be more advantageous to occupy these spots with the Ashes, the Willows, the Alders, the Poplars and the Maples, which are incomparably more rapid in their growth, which sprout afresh when felled, and whose wood is as useful in Europe where the houses are built of stone and covered with tiles or slate. I am convinced that the Cypress can never be profitably cultivated above the 44th degree of latitude; it requires heat as well as humidity, and the moderate temperature of our scanty summers is insufficient to ripen the seeds of the Bald Cypresses which were planted about Paris more than 40 years since, and which bloom every year. To the same cause must be attributed the slowness of their growth; the greater part of them are not more than 20 or 25 feet in height. The largest stocks in France are on the ancient estate of Duhamel, about 60 miles from Paris. Planted more than forty years ago, in a congenial situation, they have reached the height of 40 feet with a diameter of 11 or 12 inches; but the seeds are rarely matured. An agriculturist of excellent practical views, whose property lies partly in the plains of Bordeaux, where he has formed an establishment for the naturalization of exotic trees, has attempted the cultivation of the Cypress with the most satisfactory success.

It would be unavailing to recommend the preservation and multiplication of the Cypress in the maritime districts of the Carolinas and Georgia, though for an extent of more than 900 miles they have neither stone nor slate for building; it becomes daily more profitable for the increasing population to convert the marshes into rice-grounds, which afford a sure subsistence to the inhabitants and swell the mass of exported produce. Instead of wood, the houses will be constructed of bricks, which is already beginning to be done, and covered with slate imported from the Northern States or from Europe. It is highly probable that in less than two centuries the Cypress will disappear from the Southern States.

PLATE CLI.

A branch with leaves of the natural size. Fig. 1, *A cone. Fig.* 2, *A seed. Fig.* 3, *A kernel. Fig.* 4, *The half of a seed. Fig.* 5, *A conical excressence from the roots.*

Pl. 152.



Bessa del. Gabriel sculp.

White Cedar.

Cupressus thyoïdes.

WHITE CEDAR.

CUPRESSUS THYOIDES. *C. foliis squamulatim imbricatis; ramulis compressis; strobilis minutis, globulosis.*

Among the resinous trees of the United States, the White Cedar is one of the most interesting for the varied utility of its wood. North of the river Connecticut it is rare and little employed in the arts: in the Southern States I have not seen it beyond the river Santee, but I have been assured that it is found, though not abundantly, near Augusta on the Savannah: it is multiplied only within these limits, and to the distance of 50 miles from the shore of the Ocean.

At New York, and in New Jersey and Pennsylvania, it is known by the name of *White Cedar*, and in Maryland, Virginia and North Carolina, by that of *Juniper.* I have adopted the first denomination, which is not unknown where the second is habitually used, because the tree belongs to a different genus from the Junipers. At Boston and in Vermont, New Hampshire, and the more northern parts of America, the Arbor Vitæ is called White Cedar, but I have thought proper to retain the name for the species we are considering.

The White Cedar grows only in wet grounds. In the maritime districts of New Jersey, Maryland and Virginia, it nearly fills the extensive marshes which lie adjacent to the *salt-meadows*, and are exposed in high tides to be overflowed by the sea. In New Jersey it covers almost alone the whole surface of the swamps, of which the Tupelo and Red Maple occupy the skirts. Farther south it is mingled with the Cypress, by which it is at length entirely supplanted. In Lower Jersey and Maryland the swamps are accessible only during the dryest part of the summer and when they are frozen in the winter. The trees stand so thick in them that the light can hardly penetrate the foliage, and in their gloomy shade spring at every step tufts of the Dwarf Rose Bay, Honeysuckle and Andromeda, whose luxuriant vegetation proves that they delight in dark and humid exposures.

The White Cedar is 70 or 80 feet high, and rarely more than 3 feet in diameter, unless perhaps in the great swamps which have not been thoroughly explored, such as the *Dismal Swamp* near Norfolk in Virginia, which is covered with this species and the Cypress. When the White Cedars are close and compressed, the trunk is straight, perpendicular, and destitute of branches to the height of 50 or 60 feet: they are observed to choose the centre of the swamps, and the Cypresses the circumference.

The epidermis is very thin on the young stocks; but as they grow older it becomes thick, of a soft filaceous texture, of a reddish colour, and similar to that of an old Vine. When cut, a yellow transparent resin of an agreeable odour exudes, of which a few ounces could hardly be collected in a summer from a tree of 3 feet in circumference.

The foliage is evergreen: each leaf is a little branch numerously subdivided, and composed of small, acute, imbricated scales, on the back of which a minute gland is discerned with the lens. In the angle of these ramifications grow the flowers, which are scarcely visible and which produce very small rugged cones of a greenish tint, which changes to bluish towards the fall, when they open to release the fine seeds.

The concentrical circles are always perfectly distinct even in stocks of considerable size, but their number and compactness prove that the tree arrives at its full growth only after a long lapse of years. I have counted 277 annual layers in a trunk 21 inches in diameter and 5 feet from the ground, and 47 in a plant only 8 inches thick at the surface, which proved it to be already 50 years old. I was told that the swamp in which it grew had been burnt at least half a century before, and had been repeopled from a few stocks that escaped the conflagration, or perhaps by the seeds of the preceding year.

The wood is light, soft, fine-grained, and easily wrought. When perfectly seasoned and exposed for some time to the light it is of a rosy hue. It has a strong aromatic odour, which it preserves as long as it is guarded from humidity. The perfect wood resists the succession of dryness and moisture longer than that of any other species, and for this quality principally, as well as its extreme lightness, it is preferred at Baltimore and Philadelphia for shingles, which are cut transversely to the concentrical circles, and not parallel like those of the Cypress. They are from 24 to 27 inches long, from 4 to 6 inches broad, and 3 lines thick at the larger end: in the advertisements of Baltimore they are called *Juniper shingles,* and are sold at 4 or 5 dollars a thousand. At Philadelphia and Baltimore they are generally preferred to those of Cypress, as they are larger and are free from the defects of splitting when nailed upon the rafters. The houses in those cities, as well as in New York and the smaller circumjacent towns, are covered with them; they usually last 30 or 35 years. The domestic consumption is great, and the exportation to the West Indies is estimated at several millions.

The White Cedar has long since ceased to be employed for the frames of houses: stocks of sufficient dimensions are rare, and are more profitably reserved for shingles and for other works of joinery, for which this species is superior to the White Pine, being still more durable and more secure from worms. It continues to be used in building only near the great swamps in which it abounds, as about Great-egg Harbour and Indian river in New Jersey, and near the Dismal Swamp in Virginia.

The superior fitness of this wood for various household utensils has given rise, in Philadelphia, to a distinct class of mechanics called *Cedar coopers,* and a great number of workmen are employed for the domestic and foreign market. They fabricate principally pails, wash-tubs and churns of different forms. This ware is cheap, light and neatly made; and instead of becoming dull, like that of other wood, it grows whiter and smoother by use. The hoops are made of young Cedars stripped of the bark and split into two parts. The saplings are appropriated exclusively to this object, and vary in price from 5 to 15 dollars a thousand, according to their length: the largest are 2 inches thick at the base and 11 or 12 feet long.

At the mouth of the river Cape Fear the pilots and fishermen cover the sides of their boats with *clap-boards* of White Cedar, which they prefer to those of Cypress, as being lighter, more durable, and less liable to split.

I have been assured that this wood, selected with care, makes excellent sound-boards for forte-pianos. The merchants of Philadelphia find it the best for preserving oils. Charcoal highly esteemed in the manufacture of gun-powder is made of young stocks about an inch and a half in diameter deprived of their bark; and the seasoned wood affords beautiful lamp-black, lighter and more intensely coloured, though less abundant, than that obtained from the Pine.

In the lumber-yards of Philadelphia White Cedar boards from New Jersey, 10 or 12 feet long and of a mean breadth less than 13 inches, are sold at 20 dollars a thousand feet.

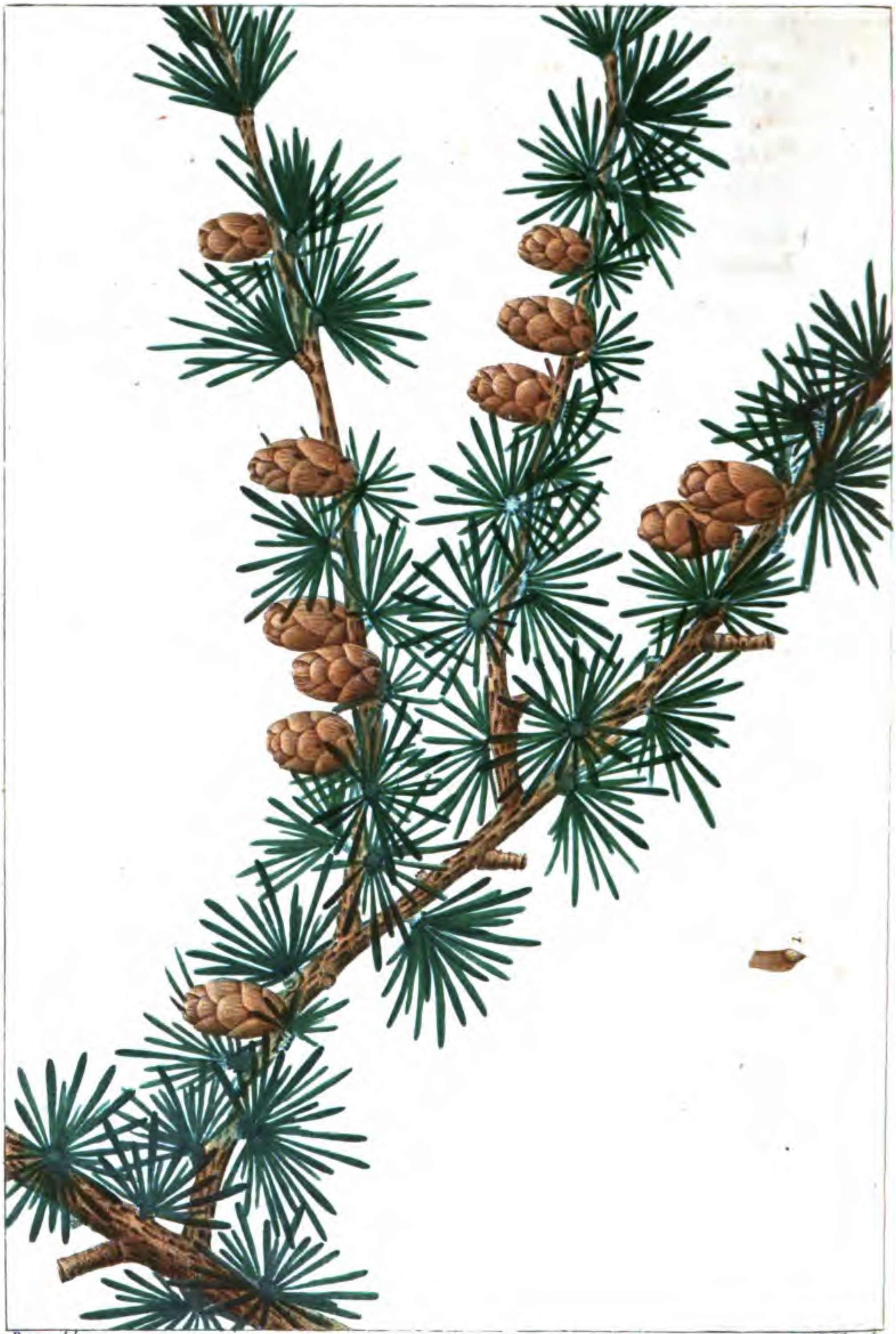
In New Jersey, not far from Philadelphia, the farmers on the borders of the Cedar swamps employ this tree for field-fence: the rails, formed of young stocks entire or split in the middle, last from 50 to 60 years when deprived of the bark: they are sold at 6 or 8 dollars a hundred, and the stocks proper for posts at 12 or 15 cents a piece.

Swamps which produce the White Cedar are a valuable species of property, and might be rendered more profitable by more judicious management.

PLATE CLII.

A branch with leaves of the natural size. Fig. 1, A cone. Fig. 2, A seed.

Pl 153.



Bessa del.

Gabriel sculp.

American Larch.

Larix américana.

AMERICAN LARCH.

Larix americana. *L. foliis brevioribus, deciduis; strobilis parvis, ovoïdeo-subglobosis; squamis paucioribus.*

In the north of the United States this tree is commonly designated by the name of *Hackmatack*, but I have preferred that of *American Larch*, which is not unknown where the other is habitually used. The French Canadians call it *Epinette rouge.*

The European and American Larches are more strictly confined than any other resinous trees to the northern zone of the two Continents, and they are the first to disappear in approaching a milder sky. The American species is most abundant in Vermont, New Hampshire, and the district of Maine; but though the soil is well adapted to its growth and the winter is long and severe, it does not form the hundredth part of the resinous growth, which consists principally of the Black Spruce, the Hemlock Spruce and the Red Cedar. According to my father's observations in his journey to Hudson's Bay, it is only beyond the St. Lawrence, particularly near lake St. John and the great and the little lake Mistassin, that it begins to abound and to form masses of woods, some of which are several miles in extent. I have been informed that it is profusely multi-

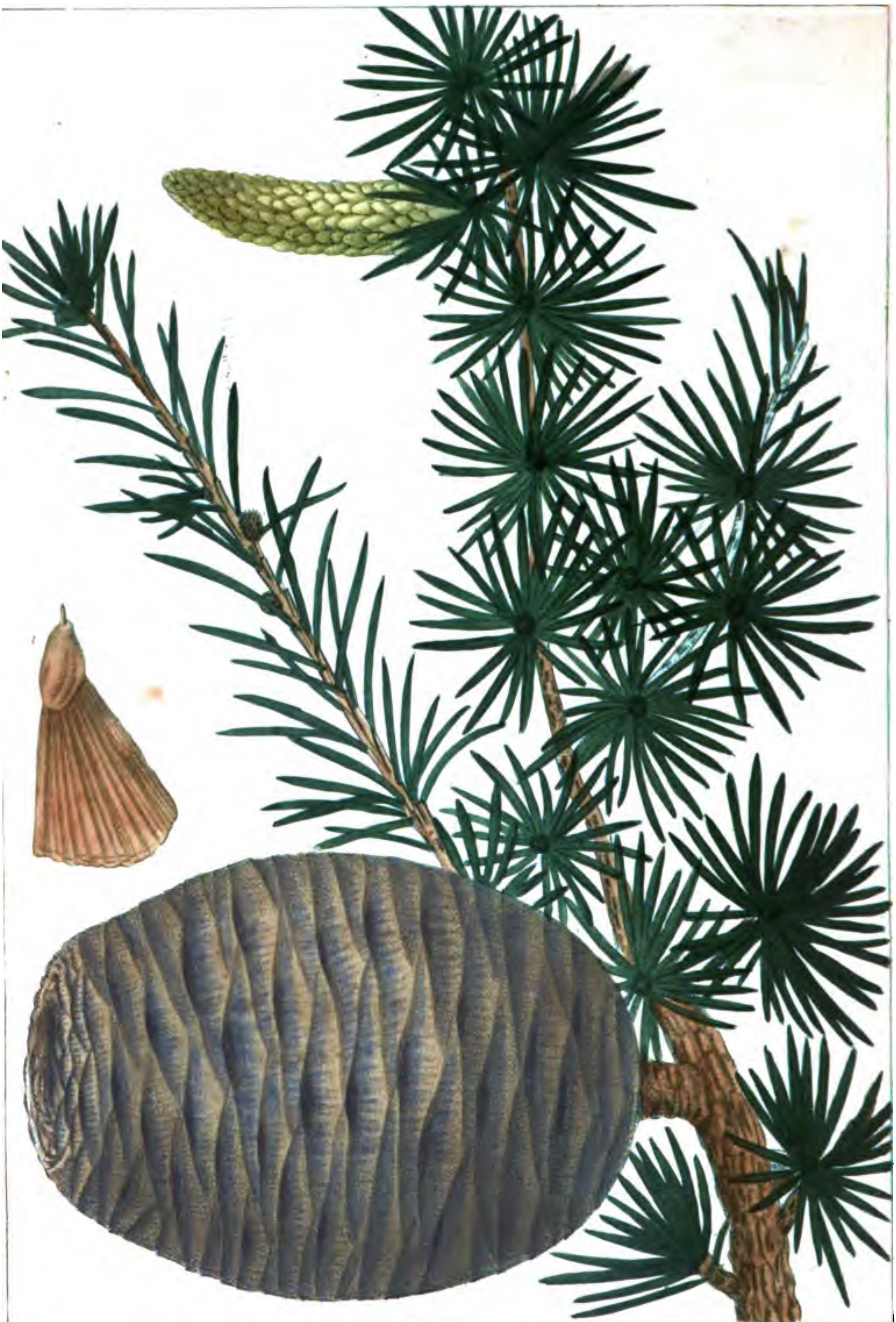
and has omitted to mention it: as I have never visited the northern parts of America, I cannot decide the question.

The cones of the European Larch are twice as large as those of the American species, but the two trees are so analogous that a separate description is unnecessary.

PLATE CLIII.

A branch with leaves and cones of the natural size. Fig. 1, *A seed.*

Pl. 154.



Bessa del. Gabriel sculp.

Cedar of Lebanon.

Larix cedrus.

CEDAR OF LEBANON.

Larix cedrus. *L. foliis fasciculatis, perennantibus; strobilis ovatis, obtusis, erectis; squamis adpressis, rotundatis.*

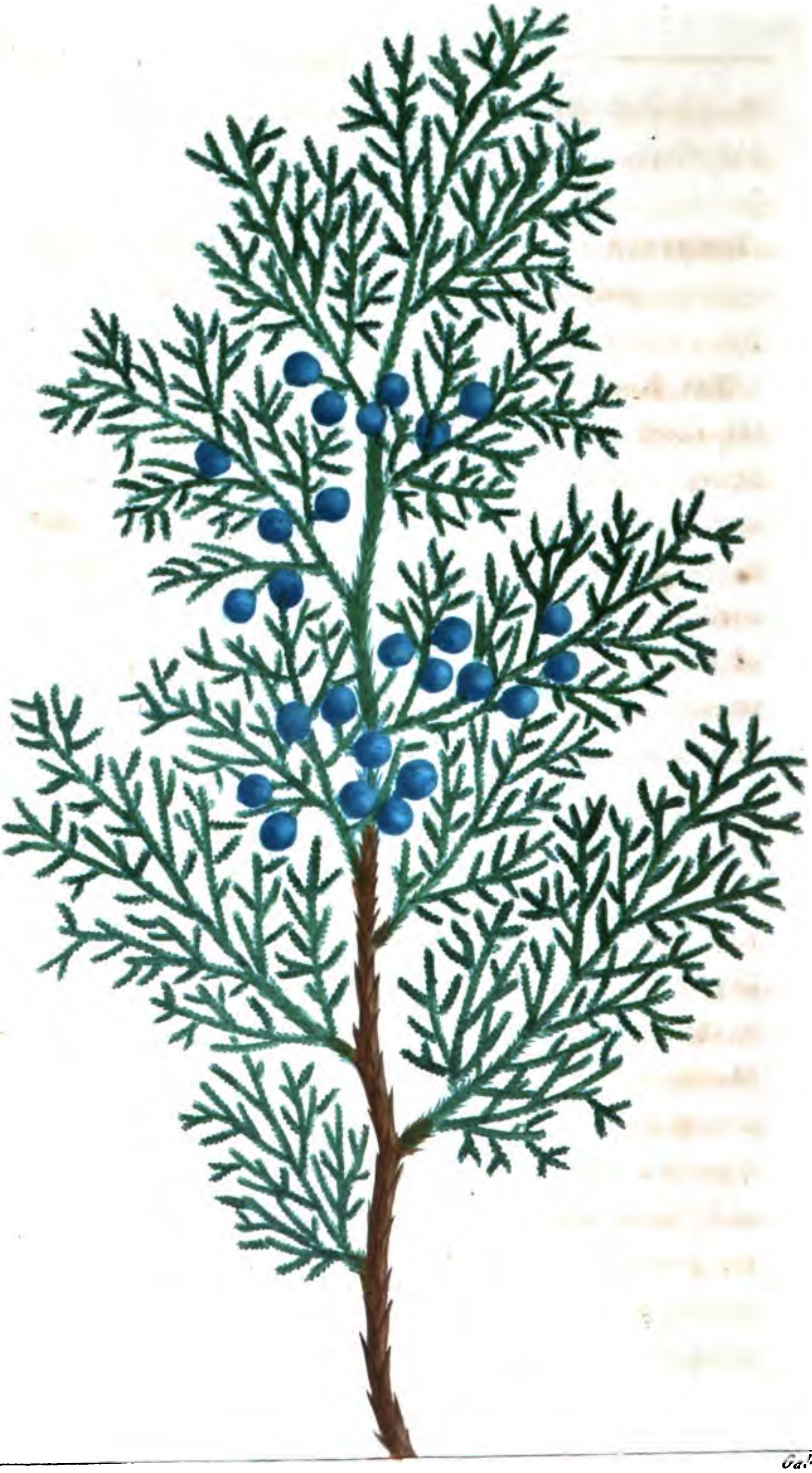
The Cedar of Lebanon is the largest and most majestic among the resinous trees of the Old World, and one of the finest vegetable productions of the globe. Till Pallas discovered it in the north of Russia in 1770, it was believed to be peculiar to the mountains of Lebanon in Asia Minor.

Modern travellers, and among others Mr. Labillardière, who visited that part of the East in 1788, inform us that the large forests seen by Belon in 1550 upon Mount Aman have disappeared, and that a few of these trees only are found upon the highest ridge, where they grow immediately below the snow which caps the summit during a great part of the year. He computes their number at about 100, of which he observed seven of extraordinary size, and measured one that was 30 feet in circumference, with the primary limbs 9 or 10 inches in diameter. Standing alone, and enjoying the free access of the light and air, they were less remarkable for stature than for expansion. In massive forests they probably attain a height proportioned to their diameter; but this tree has always been remarked for the length of its limbs, as is proved by the

The young stock should be transplanted when the circulation begins to be renewed, which is indicated by the swelling of the buds ; as much earth as possible should be left adhering to the roots, and they should be replaced in the ground without delay. When permanently fixed its branches should never be lopped, and the main stem, which constantly inclines towards the north, should be carefully preserved.

PLATE CLIV.

A branch with a cone of the natural size.



Bessa del. Gabriel sculp

Red Cedar.

Juniperus virginiana.

RED CEDAR.

Juniperus virginiana. *J. foliis ternis, basi adnatis, junioribus imbricatis, senioribus patulis.*

The Red Cedar, which belongs to the Junipers, is the most common species of its genus in the United States, and the only one which attains such dimensions as to be useful in the arts. Next to that which grows in Bermuda it is the largest hitherto discovered. According to my father's observations on the topography of American plants, Cedar Island in Lake Champlain, nearly opposite to Burlington, in latitude 44° 25′, may be assumed as one of the remotest points at which it is found towards the north. Eastward, on the border of the sea, I have not seen it beyond Wiscasset, a small town of the District of Maine, at the mouth of the Kennebeck, and in nearly the same latitude with Burlington. From Wiscasset it spreads without interruption to the Cape of Florida, and thence round the Gulf of Mexico to a distance beyond St. Bernard's Bay; an extent of more than 3000 miles. In retiring from the shore it becomes gradually less common and less vigorous, and in Virginia and the more Southern States it is rare at the point where the tide ceases to flow in the rivers; farther inland it is seen only in the form of a shrub in open, dry, sandy places. In the Western States it is confined to spots where the calcarious rock shews itself naked, or is so thinly covered with mould as to forbid the vegetation of other trees.

Though the Red Cedar grows naturally in the District of Maine and on some of the islands of Lake Champlain, it is repressed by a winter as intense as that of the north of Germany, and developes itself less vigorously than in Virginia and farther south, where the soil and climate are favourable to its expansion and to the perfection of its wood. Upon the downs it is usually buried in the sand cast up by the waves, except the summit of the branches, which appears like young trees above the surface. When unincumbered with sand, as in the middle of the islands and on the borders of the narrow sounds that flow between them and the main, it is 40 or 45 feet in height and 12 or 13 inches in diameter; but it would be difficult at present to find stocks of this size northeastward of the river St. Mary within the ancient limits of the United States.

The foliage is evergreen, numerously subdivided, and composed of small sharp scales enchased in one another. It diffuses a resinous, aromatic odour when bruised; dried and reduced to powder it has the same effect as the common Juniper, of increasing the efficacy of blister-plasters. The male and female flowers are small, not conspicuous, and borne separately on the same or on different stocks. The seeds are small, ovate berries, bluish when ripe, and covered with a white exudation.

They arrive at maturity about the beginning of the fall, and if sown immediately the greater part of them shoot the following spring, but not before the second year if they are kept several months. The quantity of gin made from them in the United States is small compared with what is imported from Holland.

The name of *Red Cedar* is descriptive only of the perfect wood, which is of a bright tint; the sap is perfectly white.

The most striking peculiarity in the vegetation of the Red Cedar is that its branches, which are numerous and close, spring near the earth and spread horizontally, and that the lower limbs are during many years as long as the body of the tree. The trunk decreases so rapidly that the largest stocks rarely afford timber for shipbuilding of more than 11 feet in length. Its diameter is very much diminished by deep, oblong crevices in every part of the trunk, which are occasioned by the large branches persisting after they are dead. My own observations and experiments lead me to believe that the growth of the tree might be quickened, and this deformity prevented, by cutting the limbs even with the trunk for two thirds of its height.

The wood is odorous, compact, fine-grained and very light, though heavier and stronger than that of the White Cedar and Cypress. To these qualities it unites the still more precious character of durability, and is consequently highly esteemed for such objects as require it in an eminent degree. But as it is procured with difficulty, and is every day becoming scarcer, it is reserved exclusively for the most important uses. The reproduction is too trifling to be mentioned in comparison with the consumption in the ports of the United States at large, and particularly at New York, Philadelphia and Baltimore. In the upper part of the frame of vessels it is joined with the Live Oak to compensate its excessive weight, and this usage, more than any other, has wasted the species. Recourse is now had to the coast of East Florida between the St. Mary and the St. John, which will soon be exhausted in its turn. The nearer the Red Cedar grows to the sea, and the farther southward, the better is its wood. Next to ship-building it is most commonly used for posts, which are highly esteemed and are reserved for enclosing court-yards and gardens in the cities and their vicinity. The barriers of the side-walks in the streets of Philadelphia are made of this wood: they are 10 or 11 feet long and 8 inches in diameter, and are sold at 80 cents each, while those of White Cedar cost only 16 or 17 cents. It is eminently fitted for subterranean water-pipes, but is rarely employed from the difficulty of obtaining stocks of sufficient diameter. Small round or oval tubs, very neatly wrought and hooped with brass, are made with staves consisting partly of the sap and partly of the heart. I have observed that the turners at Philadelphia make the large stop-cocks of this wood. In the Southern States it is commonly chosen for coffins.

In some parts of Lower Virginia, particularly in the County of York, the Cedars are trimmed and the branches are interlaced with stakes driven into the earth at small distances for the enclosure of cultivated fields; but this is a poor resource, the only advantage of which is the economy of wood.

The Red Cedar is exported to England, but I am unable to say for what purpose; probably it is not solely for the manufacture of pencils, though it seems as well adapted to that object as the Juniper of Bermuda.

The Red Cedar has been naturalized more than fifty years in the pleasure-grounds of France and England: its growth would be rapid on the borders of the sea in our southern departments, where its propagation cannot be too warmly recommended.

PLATE CLV.

A branch with leaves and berries of the natural size.

AMERICAN ARBOR VITÆ,

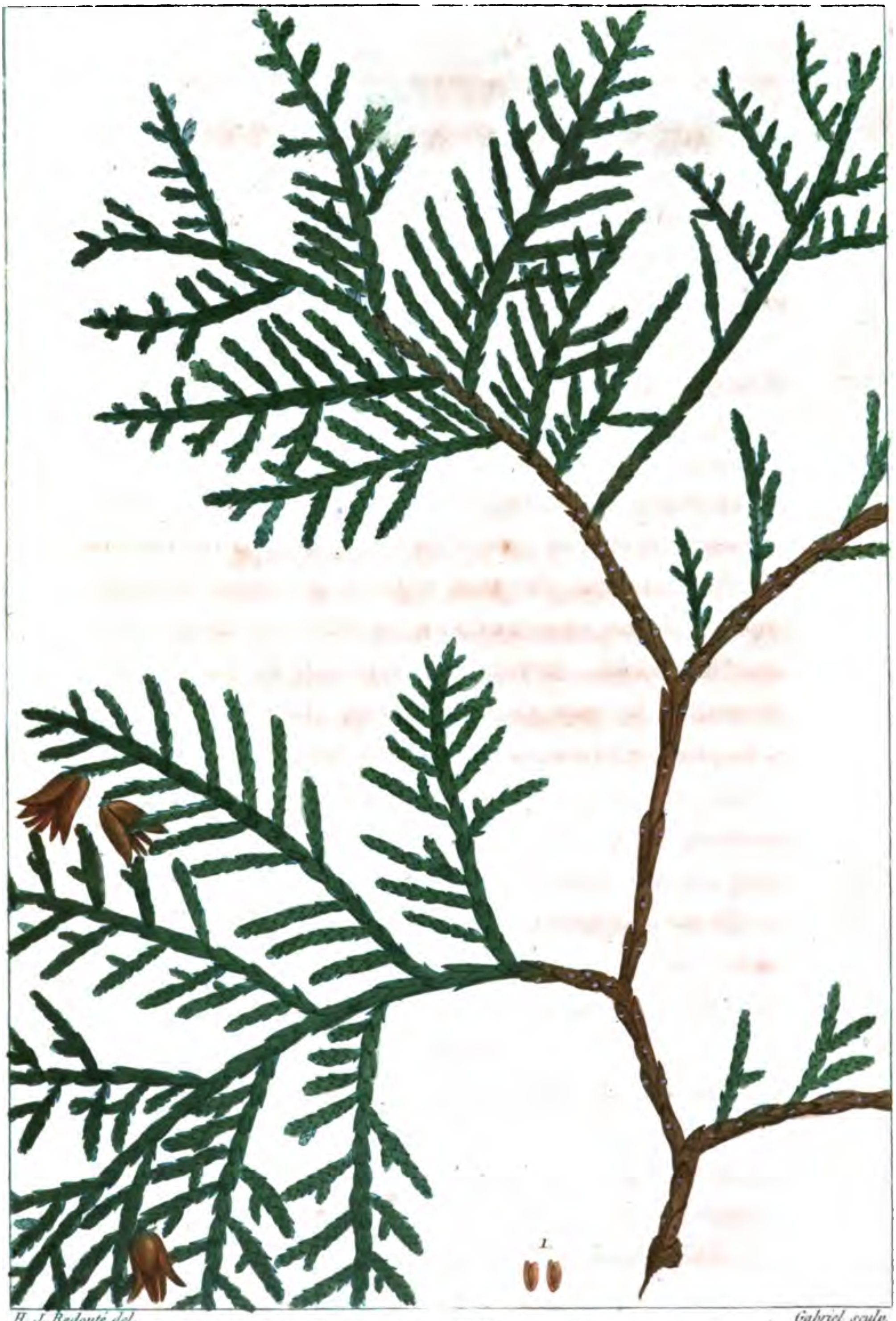
OR

WHITE CEDAR.

Thuya occidentalis. *T. ramulis ancipitibus, foliis quadrifariam imbricatis, ovato-rhombeis, adpressis, nudis, tuberculatis; strobilis ovatis; squamis oblonge-ovalibus; seminibus alatis.*

This species of *Thuya*, the only one that has been discovered in the New World, is the most interesting of the genus for the properties of its wood. My father mentions the shores of Lake St. John in Canada as its northern limit, beyond which he saw no trace of it in travelling in that direction more than 300 miles. It abounds in favourable situations between the parallels of 48° 50′ and 45°; farther south it becomes rare, and solitary stocks are seen only on the sides of torrents and on the banks of certain rivers, as on the Hudson amid the highlands, and near the *rapids* of the Potowmack in Virginia. Goat's Island, round which the Niagara divides itself to form the stupendous cataract which is one of the most wonderful spectacles of Nature, is seen from the banks of the river to be bordered with the Arbor Vitæ.

In Canada and the northern part of the United States this tree is called *White Cedar*, but in the District of Maine it is frequently designated by the name of



H. J. Redouté del.

Gabriel sculp.

Arbor vitæ or White cedar.

Thuya occidentalis.

Arbor Vitæ, which I have preferred, though less common, because the other is appropriated to the *Cupressus thyoides.*

The Arbor Vitæ is 45 or 50 feet in height and sometimes more than 10 feet in circumference; usually, however, it is not more than 10 or 15 inches in diameter at five feet from the ground. From the number and the distinctness of the concentrical circles in stocks of this size its growth must be extremely slow: I have counted 117 in a log 13 inches and 5 lines in diameter. They are more compressed near the centre, as in the Cypress and White Cedar, which is contrary to the arrangement observed in the Oaks, the Beeches and the Maples.

The foliage is evergreen, numerously ramified, and flattened or spread. The leaves are small, opposite, imbricated scales; when bruised they diffuse a strong aromatic odour. The sexes are separate upon the same tree. The male flowers are in the form of small cones: to the female blossom succeeds a yellowish fruit about 4 lines in length composed of oblong scales, which open through their whole length for the escape of several minute seeds surmounted by a short wing.

In Lower Canada, New Brunswick, Vermont and the District of Maine, the Arbor Vitæ is the most multiplied of the resinous trees, after the Black and the Hemlock Spruces. A cool soil seems to be indispensable to its growth. It is never seen on the uplands among the Beeches, the Birches, etc., but is found on the rocky edges of the innumerable rivulets and small lakes which are scattered over these countries, and occupies in great part, or exclusively, swamps from 50 to 100 acres in extent, some of which are accessible only in the winter when they are frozen and covered with several feet of snow. It abounds exactly in proportion to the degree of humidity, and in the driest marshes it is mingled with the Black Spruce, the Hemlock Spruce, the Yellow Birch, the Black Ash; and a few stocks of the White Pine. In all of them the surface is covered with a bed of Sphagnum so thick and surcharged with moisture that the foot sinks half-leg deep while the water rises under its pressure.

The full-grown Arbor Vitæ is easily distinguished by its shape and foliage. The trunk tapers rapidly from a very large base to a very slender summit, and is laden with branches for four fifths of its height. The principal limbs, widely distant and placed at right angles with the body, give birth to a great number of drooping secondary branches, whose foliage resembles that of the White Cedar.

On the borders of the lakes, where it has room and enjoys the benefit of the light and air, it rises perpendicularly, grows more rapidly and attains a greater size than when crowded in the swamps, where its thick foliage intercepts the light and impedes the circulation of the air. I have besides remarked that in the swamps its trunk is rarely straight, but forms the arch of an ellipse more or less inclined. Its sides swell into two or three large ridges, which are a continuation of the principal roots.

The bark upon the body is slightly furrowed, smooth to the touch and very white when the tree stands exposed. The wood is reddish, somewhat odorous, very light, soft and fine-grained: in the northern part of the United States and in Canada it holds the first place for durability. From the shape of the trunk it is difficult to procure sticks of considerable length and an uniform diameter; hence in the District of Maine it is little employed for the frame of houses, though in other respects proper for this object, and still less for the covering. It is softer than the White Pine, and gives a weaker hold to nails, for which reason the Canadians always join it with some more solid wood. The following extract from my father's journal confirms what I have said of its durability: "In my journey to Hudson's Bay in 1792, I arrived in August in the vicinity of Lake *Chicoutomé,* in latitude 48°. I found the mansion-house of the church established by the Jesuits for the instruction of the natives yet standing. This building, constructed in 1728, as was proved by an inscription over the door, with square beams of the Arbor Vitæ laid one upon another without covering on either side, remained perfectly sound after more than 60 years."

The most common use of this tree is for rural fence, for which it is highly esteemed. The posts last 35 or 40 years, and the rails 60, or three or four times as long as those of any other species. The posts subsist twice as long in argillaceous as in sandy lands. While the usage of such fences continues the utmost economy should be practised in cutting the Arbor Vitæ according to the rules prescribed for resinous trees. In Canada it is selected for the light frame of bark canoes. Its branches garnished with leaves are formed into brooms, which exhale an agreeable aromatic odour. Kalm affirms that the leaves, pounded and moulded with hog's lard, form an excellent ointment for the rheumatism.

The Arbor Vitæ was introduced into France more than 200 years since: the superior beauty of its form and foliage entitle it to preference over the Chinese *Thuya* as an ornament of pleasure-grounds, and the quality of its wood is a sufficient motive for propagating it in unimproved marshes in the north of Europe; but the White Cedar, which is taller and of a more uniform diameter, more rapid in its growth, and of equal durability, would be a still more valuable acquisition.

PLATE CLVI.

A branch with leaves and cones of the natural size. Fig. 1, *Seeds.*

RECAPITULATION

Of the Uses of the North American Trees.

In the history which I have thus completed of the forest-trees of North America, and particularly of the United States, my principal aim has been to impart an accurate knowledge of the several species, by describing the characters of their leaves, flowers and fruit, and explaining all their distinguishing peculiarities. My object in the following recapitulation is to exhibit in one view those which are the most useful in the mechanical arts, so that it may be readily known what wood is employed in the different parts of the United States in all the branches of industry of which wood is a material.

It would have been highly useful to have entered into a critical examination of the reasons for adopting or rejecting each species in each of the arts. These reasons may be purely local, or they may be founded on custom or experience. But I must acknowledge my incompetency to a task which would require a knowledge of all the arts in question, with which I am wholly unacquainted. It is only from information procured from others that I have composed this summary, in which I venture to affirm that more omissions will be observed than errors.

SHIP-BUILDING.

DISTRICT OF MAINE, NEW BRUNSWICK, AND NOVA SCOTIA.

Keel. The Sugar Maple holds the first place, and the White Elm the second. In these regions both species attain their fullest developement, and consequently afford timber of ample dimensions.

Lower frame. From the scarcity and even the total want of the White Oak throughout the greater part of the District of Maine, and the inadequate supply of the Grey and Red Oaks, they are reserved for those parts of the frame which are exposed to be alternately wet and dry. In the lower parts they are replaced by inferior species of wood, such as the Yellow Birch, the Red Beech, the Sugar Maple and the White Ash, which would very speedily decay if they were not constantly in the water. Of these, the Yellow Birch and Red Beech are the best, and the White Ash the worst. They are felled at the proper season of the year, stript of the alburnum, and perfectly seasoned before they are used.

BOSTON.

At Boston, though situated only a few degrees farther south than the ports of the District of Maine, the influence of a milder climate is sensibly felt. A greater variety of Oaks is found in the forests of the surrounding country, the White Oak is more abundant, and the materials for ship-building are better.

Keel. Of White Oak.

Frame. Principally of White Oak. In the lower frame the Red Oak is sometimes employed, and under that denomination are also comprised the Grey and Scarlet Oaks. Some old writers inform us that the Swamp White Oak was formerly in repute: that it is no longer used is probably owing to its rarity.

Knees. As much as possible of White Oak; but as this is rare, recourse is had to the Black Spruce, especially for repairing old vessels.

Sides. Of White Oak, with the gunwales of Long-leaved Pine imported from the Southern States.

Trunnels. Commonly of White Oak, and sometimes of Locust from Virginia.

Deck. Of White Pine; but the Norway Pine is preferred. This is brought from New Hampshire by the Middlesex Canal, which connects the river Merrimack with the harbour of Boston: it is called Yellow Pine, though that name belongs to the *Pinus mitis,* which is not found in so high a latitude.

Masts and *yards.* As in the District of Maine, the masts of White Pine, and the topmasts and yards of Black Spruce.

Observation. A few vessels are constructed at Boston of Live Oak and Red Cedar.

NEW YORK.

Keel. Always of White Oak. Formerly the Shell-bark

Hickory was sometimes employed ; but no stocks of sufficient size are now found near the ports.

Lower frame. Principally of White Oak, with which is joined the Rock Chesnut Oak.

Upper frame. Of Live Oak and Red Cedar alternated: both are imported from East Florida.

Sides. Of White Oak : I believe the Rock Chesnut Oak is also used ; for I have seen planks 2 or 3 inches thick in the dock-yards, which were easily recognized by the bark upon the edges, and which seemed destined for this use.

Knees. As much as possible of White Oak; and when this cannot be procured, of Rock Chesnut Oak from the upper part of the North River.

Deck. Of Yellow Pine from New Jersey and the eastern shore of Maryland.

Masts. Of White Pine, with the topmasts and yards of Black Spruce.

PHILADELPHIA.

Keel. Almost always of White Oak, and in a few instances of Shell-bark or Pignut Hickory : the Pignut, which is tougher than the other species, is preferred.

Lower frame. Of White Oak, with a small proportion of Black Walnut, Locust and Red Mulberry.

Upper frame. In the best built vessels, of Live Oak and Red Cedar, as in New York. The Cedar is very durable, and its lightness compensates for the weight of the Oak. A small quantity of the Red Bay, imported from the Southern States and from Florida, is advantageously substituted for the Cedar. The Locust, the Red Mulberry and the Black Walnut are also admitted. They are lighter than the Oaks, stronger than the Cedar, and almost as durable as either; but they cannot be procured in sufficient abundance. Their perfect wood, when thoroughly seasoned, lasts longer than the White Oak. The Black Walnut, in particular, must be entirely freed from the sap, which is soft and rapidly decays. These species grow on the banks of the Susquehannah, and large Red Mulberry Trees are found also on the Delaware. The White Oak is excluded from vessels of the best workmanship.

Sides. Always of White Oak.

Trunnels. Of Locust.

Knees. As at New York, of White Oak when it can be procured, and of Rock Chesnut Oak; of these the consumption is nearly equal. The Black Walnut is highly esteemed, but rarely employed on account of its scarceness. The Red Mulberry makes excellent floor-timbers.

Deck. Commonly of Yellow Pine from the upper part of the Delaware or from the eastern shore of Maryland, and of Long-leaved Pine from North Carolina and Georgia.

Masts. Of White Pine, the topmasts of Yellow Pine, and the yards of Black Spruce from the District of Maine.

BALTIMORE AND ALEXANDRIA.

The art of ship-building is carried to great perfection in these ports, and nearly the same materials are employed as at Philadelphia, viz: the White Oak for the keel and lower part of the frame, and the Live Oak and Red Cedar for the upper part. The Locust is admitted as well as the Red Cedar, and as both species are much more abundant than in the vicinity of Philadelphia, they are more extensively used. The knees are of White Oak, Rock Chesnut-Oak and Post Oak. The masts are commonly of Yellow Pine, and sometimes of Long-leaved Pine from the river Elisabeth near Norfolk.

CHARLESTON AND SAVANNAH.

Keel. Always of the Long-leaved Pine, which is not inferior to the White Oak.

Lower frame. Principally of Live Oak, and partly of the perfect wood of the Long-leaved Pine, which is thought to be as solid as the White Oak. The Post Oak and the Spanish Oak are also admitted.

Upper frame. Of Live Oak and Red Cedar. The Locust and Red Mulberry are little used, as they are rare in the neighbouring country; a small quantity is brought from Upper Georgia to Savannah by the river of that name.

Deck. Of the Long-leaved Pine, which is the best species of its genus in North America.

Knees. Commonly of Live Oak, which is the best wood for this purpose.

Sides. Almost always of the heart of the Long-leaved Pine, which is esteemed as solid and durable as the White Oak, but is said to form less perfect joints at the stem and stern.

Trunnels. Of the heart of the Long-leaved Pine when the side-planks are of the same species, and of Live Oak, Locust, or Red Mulberry (which is as good as the Locust), when the sides are of Oak.

Masts. Of Long-leaved Pine, which is stronger than White Pine; the topmasts are of Long-leaved Pine, and the yards of Black Spruce from the District of Maine.

When these materials are perfectly seasoned before they are employed, the vessels constructed with them are more durable than those built at New York and Philadelphia, which consist in a greater proportion of White Oak.

LOUISVILLE ON THE OHIO.

Keel. Of White Oak.

Upper frame. Of White Oak and Black Walnut.

Lower frame. Of White Oak, with a large proportion of Locust, Red Mulberry and Black Walnut, and a mixture of Wild Cherry Tree and Red Elm. These species are excellent when thoroughly seasoned. The Black Walnut in particular should be wholly deprived of its alburnum.

Knees. Of Locust, Red Mulberry, Black Walnut, and White Oak: those of Locust and Red Mulberry are less easily procured.

Sides. Always of White Oak.

Trunnels. Of Locust.

Deck. Of Yellow Pine.

Masts. Of White Pine; the yards are of Black Spruce from the sources of the river Alleghany.

Keeled boats. On the banks of the Ohio I saw building a great number of large boats, of which the ribs, without exception, were of Black Walnut, and the sides of White Oak.

NEW ORLEANS.

I have never visited Lower Louisiana, and cannot speak with certainty of the manner of constructing vessels at New Orleans. I have been told that the frame is of Live Oak and Red Cedar; the sides, deck and masts, of the perfect wood of the Bald Cypress, which is said to be far superior, when thoroughly seasoned, to any species of Pine.

Pumps. At New York, Philadelphia and Baltimore, of Pitch Pine; and in the Southern ports, of Loblolly Pine.

Pullies, cleats and *oars.* Always of White Ash in the Northern States; at New York and Philadelphia, in equal proportions of White Ash and of Red Ash, which becomes more common in advancing southward.

Many persons are aware that the Red-Elm would be preferable for pullies; but eastward of the Allehanies it is too little multiplied to supply the consumption. The Pride of India is also well adapted to this purpose.

The White Ash, from its strength and elasticity, makes the best oars

I have been informed that the Hickories are used with advantage for cleats; they are stronger than those of Ash, but require to sit loosely in the holes, as they swell with moisture and would speedily decay.

Handspikes. Of White Ash; but more generally, in the Middle and Southern States, of Hickory, which is preferred on account of its strength.

Images on the bow. Always of White Pine.

CIVIL ARCHITECTURE.

Throughout the United States nineteen twentieths of the houses in the small towns and in the country are of wood. In the larger cities, five sixths of them are of brick, and one fifth, or perhaps one third, in a dozen secondary towns.

The wooden houses are of two sorts: those of a great proportion of the husbandmen in the interior parts of the country are built of logs, and are so simply constructed that they are rendered habitable in three or four days. The logs, which are 20 or 30 feet long and 4 or 5 inches in diameter, are laid one upon another, crossed at the ends, and confined by notches. The interstices are filled with clay. The roof is formed of lighter sticks of the same length, gradually approximating on each side, and supplying the place of rafters; to these the shingles are attached by small wooden pins. Two doors, which frequently serve instead of windows, are cut directly opposite to each other in the middle of the walls. The chimney is at one end of the house, and a partition divides the building into two apartments. The barns and stables are similarly constructed, but less carefully closed.

The *framed houses* are commonly two stories high, spacious and commodiously planned. They are covered with *clap-boards*, and when painted white have an agreeable appearance and indicate the easy circumstances of their tenants. When proper care is bestowed upon the covering, and the paint is renewed every 10 or 12 years, it lasts 30 or 40 years.

The frame, the inner and outer sheathing, the floors, and the shingles of the roof, are made, in different parts of the United States, of different species of wood which have been found best adapted to these objects.

NEW HAMPSHIRE, VERMONT, MASSACHUSETTS, RHODE ISLAND AND CONNECTICUT.

At Boston, Portsmouth, Portland, Hollowel, and other less considerable towns, as well as in the country, the White Pine has always been preferred for wooden houses. But as it has become rare it is partly replaced by the Black and Hemlock Spruces, which are cheaper and more abundant.

Frame. Of White Pine; but the joists and rafters are more frequently of Black Spruce.

Sheathing of the frame. Of Hemlock Spruce.

Clap-boards. Of White Pine.

Floors. Generally of White Pine. In the country the Black Spruce is sometimes preferred, as being tougher and less liable to be bruised by the furniture : on the other hand, it does not bear so good a polish, and is apt to crack.

Roof. Always of White Pine shingles, which last 15 or 20 years. The Arbor Vitæ would be preferable for this object; but in the Northern States it is too small to be cut with advantage for shingles, and is reserved for posts.

Lathes. Of Hemlock Spruce.

Doors, *window-sashes* and *mouldings.* Of White Pine.

NEW YORK AND NEW JERSEY.

Frame. Of White Pine in houses built entirely of wood.

Covering and *inside work.* Of White Pine.

Floors. Of White Pine, when they are to be carpeted; otherwise, of Yellow Pine, which is stronger and tougher.

Roof. Of White Cedar shingles.

Observation. In the city of New York the frame of brick houses is often of Oak, the joinery within and the doors and windows are of White Pine, and the roof is slated or covered with White Cedar shingles.

PENNSYLVANIA AND DELAWARE.

At Philadelphia the houses in the city are of brick; those of the suburbs are generally of wood, and are built of the same materials as in New York, except that the Yellow Pine is employed as well as the White Pine. In brick houses the sills and the joists of the upper stories are of White Oak; at present the Black Oak is also extensively used, and the Sweet Gum is admitted for the upper stories.

Rafters. Preferably of the White and Black Oaks: the Tulip Tree or Poplar, which unites lightness with solidity, is equally esteemed.

Floors. Commonly of Yellow Pine.

Roof. Of White Cedar or Cypress shingles imported from the Southern States.

Doors, windows and *mouldings.* The panels of White Pine; the casings and the window-sashes of Yellow Pine; the mouldings of the outer doors, the cornices of the apartments, and the mouldings about the fire-places, of White Pine.

At Conelsville on the Yohiogany, and at Brownsville on the Mononghahela, in the western part of Pennsylvania, I observed that the frame was of White Oak; the floors, of narrow boards of the same species; the shingles, of Black Oak, which are less easily detached than those of White Oak; the clap-boards, the interior joinery, the doors, window-sashes, etc., of Poplar or Tulip Tree.

At Pittsburgh and Wheeling on the Ohio the frame is of White Oak; the outside, the joinery within, and the roof, of White Pine. Many houses in this part of Pennsylvania are built wholly of White Oak, except the roof, which is made of Black Oak in the absence of the Pine and Poplar. The Poplar or Tulip Tree is inferior to the Pines, but it is more durable than the Oaks, and is wrought with greater ease and neatness. Chesnut shingles are more lasting, but they are not easily found.

MARYLAND AND THE EASTERN PART OF VIRGINIA.

At Baltimore and Alexandria one third of the houses are of brick; the rest are principally of Yellow Pine, with the inside work of White Pine, and the roof of White Cedar, which is here called *Juniper*. At Petersburgh and in its vicinity the wooden houses are of Loblolly Pine, with the roof of Cypress.

NORTH CAROLINA, SOUTH CAROLINA, AND THE LOWER PART OF GEORGIA.

Three quarters of the houses in Charleston, and four fifths of those in Wilmington and Savannah, are of wood.

Frame. Wholly of Long-leaved Pine; the outer covering is of White Pine, and the interior work of Cypress and of White Pine.

Doors, windows and *cornices.* Sometimes of White Pine, but more generally of Cypress, which is far better.

Roof. Of Cypress for houses of every description.

Observation. The Cypress was formerly used almost exclusively in building, but it is now replaced by the Long-leaved and White Pines. Farther inland the houses are still constructed wholly of Cypress, and are more lasting than such as are made of the Long-leaved Pine: both are painted white.

UPPER PART OF THE CAROLINAS.

The houses are built of Yellow Pine, and covered with shingles of the same wood or of the Tulip Tree.

KENTUCKY.

At Lexington, the largest town of the Western States, more than three quarters of the houses are of wood. They are composed in the following manner, both there and in the surrounding the country:

Frame. Of Blue Ash and White O[illegible]. The Oak is preferable, though less easily wrought than the Ash.

Floors. The lower floors are of Blue Ash or of White Oak, and sometimes of Tulip Tree or Poplar. Pine would be preferred if it could be easily procured. The upper floors are of Poplar.

Outside. Of Blue Ash or Tulip Tree : the last species is liable to warp.

Inside work. Commonly of Poplar or Wild Cherry Tree, and sometimes of Black Walnut.

Roof. The rafters are covered with boards of the Hackberry, and these with Poplar shingles, which are made very short to prevent their warping : they are said to last forty years, and not to split from the effects of frost or sunshine.

LOWER LOUISIANA.

I have been informed that all the buildings in this part of the United States are of Cypress.

CABINET-MAKING.

MASSACHUSETTS, NEW HAMPSHIRE AND VERMONT.

Wood proper for Cabinet-making becomes more rare in America in advancing into the higher latitudes ; but several species are found in the north of the United States, which, though inferior to Mahogany, form elegant furniture. The superiority of Mahogany consists not so much in the richness of its colouring as in the fineness of its grain and in its hardness, which render it susceptible of a brilliant polish, and preserve it from injury by the impression of other bodies. As it is cheaply obtained from the West Indies, it is used by all persons in easy circumstances residing at a moderate distance from the ports. Among the native trees, in the Northern States, the Black Birch, the Yellow Birch, the Canoe Birch, the Red-flowering Curled Maple, the Bird's-eye Maple, the Wild Cherry Tree and the Sumac, are chiefly employed in cabinet-making.

The Black and Yellow Birches are of a roseate hue, which deepens with age; as they are very fine-grained they receive a brilliant polish and have a silky surface. They are usually employed for tables, writing-desks, the balustrade of staircases, the frame of sofas and hair-bottomed chairs, etc. The Curled Maple and Bird's-eye Maple form elegant bedsteads. Divided into thin sheets, they serve to inlay Mahogany, and the same use is made of a section of the Canoe Birch immediately below the first division of the trunk. The cabinet-makers of Boston select the Birch logs proper for these purposes among the wood exposed for sale as fuel.

MIDDLE AND WESTERN STATES.

In the large towns the furniture is usually made of Mahogany; in the country it is of Wild Cherry, Black Walnut, Curled Maple, Buttonwood and Sweet Gum. The Wild Cherry and the Black Walnut are preferred, as being the most like Mahogany, particularly the Cherry Tree; the Walnut, naturally of a dusky hue, becomes nearly black with age. The Curled Maple, the Buttonwood and the Sweet Gum, are more especially reserved for bedsteads. To render the undulations of the Curled Maple more apparent, after being polished it is lightly rubbed with nitric acid and again with linseed oil.

SOUTHERN STATES.

The greater part of the furniture was formerly made of Red Bay, which is of a beautiful red colour, fine-grained, silky, and perfectly adapted to this use; but it is now almost wholly superseded by Mahogany.

COOPER'S TRADE.

This art employs a great number of hands in North America, where, besides the ordinary use of containing liquids, casks are employed, instead of sacks, for corn and flour, for produce of other kinds, and for certain species of merchandize that are exported or consumed at home. A great quantity of staves is also sent to England, to the Madeira Isles and to the West Indies.

In 1807, the value of the staves imported into Liverpool from the United States exceeded 720,000 dollars. Tables of the exportation from the United States in 1791 and 1792 exhibit the following statement of the number of staves sent abroad during these years:

New Hampshire	1,250,000
Massachusetts	5,250,000
Rhode Island	270,000
Connecticut	1,100,000
New York	5,560,000
Pennsylvania	2,800,000
New Jersey	50,000
Delaware	40,000
Maryland	1,700,000
Virginia	7,400,000
North Carolina	2,300,000
South Carolina	500,000
Georgia	860,000
TOTAL	29,080,000

The country west of the Alleghanies has for several years furnished large supplies of this article, which pass down the Ohio and the Mississippi to New Orleans. Great quantities are also carried from Lake Champlain to Quebec. The staves of Virginia, Maryland and Pennsylvania, from the influence of a milder climate and a less humid soil, are much superior to those of the Northern States.

Besides the White Oak, several other species, such as the Rock Chesnut Oak, the Post Oak, the Chesnut White Oak, the Overcup White Oak, etc., have their pores so imperfectly closed as to absorb liquids, especially such as are of a spiritous nature. But for train oil, for melasses and other fermenting fluids, these species are too compact, and are less eligible than the Red Oak, which is of so loose a texture that water may be made to bubble by putting one end of a staff into it and blowing at the other; the air disengaged by fermentation is thus allowed to escape, and the fluid is retained, unless, like the finer oils, it is extremely subtile. When melasses is put into White Oak casks, as the wood refuses a passage to the air which is produced in fermentation at a temperature like that of the West Indies, the cask is apt to become distended and leaky.

Red Oak staves are made of several species, all similar in their organization, viz: in the Northern States, of the Red Oak and the Grey Oak; in the Middle and Western States, chiefly of the Black Oak, and also of the Scarlet, Red and Pin Oaks; in Maryland, Lower Virginia, and all the southern parts of the United States, of the Spanish Oak, which is the best of the class. This sort is one third or even one half cheaper than the *White Oak staves;* but the price of both is four times as great as it was fifty years ago, owing to the great developement of American commerce, to the prodigious consumption of a population which doubles in a little more than 20 years, and to the neglect of all measures for renewing the forests.

Throughout the United States, with the exception of the District of Maine and the northern parts of Vermont, casks of all capacities are hooped with young

Hickories, and perhaps one twentieth of them with young White Oaks. The saplings of both species are split in the middle, and the hoops are crossed and confined by notches instead of ligatures as in Europe.

The young stocks are exported for hoops to the West Indies; but I do not know that they are sent to Europe, where the Chesnut is preferred and is cultivated for this purpose — an example deserving of imitation in the United States, especially near the commercial capitals.

At Nova Scotia, barrels for containing salted fish are made of the heart of the Red Spruce bound with saplings of Yellow Birch, which are easily distinguished by their brilliant bark. In the District of Maine these barrels are of White Pine; a great number of staves are also made of White Ash, and are esteemed the best for salted provisions. The hoops are of Beech, Yellow Birch and Black Ash, which are inferior to the Hickory and White Oak; but the Hickory does not grow so far north, and the Oak is rare. Plantations of White Oak for hoops would be highly profitable in the District of Maine. (*See the description of the Chesnut, and the recapitulation of the properties of the Hickories.*)

CHAIR-MAKING.

Windsor chairs. In all the cities of the United States this branch of industry forms a distinct trade. Windsor chairs are in general use, and they are exported from the Northern States to the Southern and to the West Indies.

At Hollowel, Portland, Portsmouth, etc., the seat is of Basswood, the lower frame of Sugar Maple, and the bow and rods which compose the back, of White Ash.

At New York, Philadelphia, Baltimore and Richmond, the seat is of Tulip Tree, the legs of Red-flowering Maple, the rods of the back, of Shell-bark Hickory, and the bow of White Oak. These species are not preferable to those in use in the more northern States, except the Tulip Tree, which is firmer and more durable than the Basswood.

In the Northern States, particularly at Boston, chairs of this sort are made wholly of White Pine, except the bow, which is of White Oak: they are light and cheap, but easily broken and of little value. In well-furnished apartments *japanned chairs* are fashionable; they are made of Red Maple, painted, varnished and gilt; the seat is of cane or of rushes (*Tipha angustifolia*) cut in the salt-meadows.

In the country, common chairs are made of Maple, and sometimes of Hickory, with the bottom of straw.

COACH-MAKING.

At Boston the panels of coaches and chaises are made of the Tulip Tree or Poplar, which is brought from the Middle States; the top and bottom are of White Pine;

the frame of the body, of Black or Yellow Birch, and the *carriage* of White Ash.

In New Hampshire and the District of Maine the panels are of Basswood, and the other parts, of the same materials as at Boston.

In Vermont I have seen Butternut boards employed for panels, for which they are said to be well fitted.

At New York, Philadelphia and Baltimore, the panels are of Tulip Tree, which furnishes boards of an extraordinary width. This wood is fine-grained, polishes well, and receives paint in a superior manner. The top and bottom of the body are of White Pine, or still better of White Cedar; the frame and carriage are of White or Red Birch. I have been told in the Southern States that the Persimon is superior to the Ash for shafts, which require great strength united to great elasticity.

Coach-making is carried to a high degree of perfection, especially at Philadelphia, and furnishes articles of exportation to the Southern States and to the Spanish Colonies. To the excellence of the materials are added lightness, strength and elegance in the workmanship.

CARTWRIGHT'S WORK.

This trade is more perfected in Philadelphia than in any other part of the United States, both for materials and execution. The frame, boarding and pole of waggons are of Oak, though many farmers prefer the Black or Sour Gum, especially for the bottom, and assert that it is twice as durable as the White Oak. The axle-tree, instead of iron, is always of Hickory wood, and preferably of Pignut Hickory: in the District of Maine it is of Sugar Maple.

Coach-wheels. At New York, and in all the more northern towns, the nave is of White Elm; in the Middle States, of Sour Gum; at Charleston S.C., of Wahoo. The felloes are generally of Red or White Ash, and the spokes of White Oak. Near Richmond in Virginia, I have seen felloes made of Swamp or Willow Oak, which, when seasoned, is stronger than the White Oak, and less liable to split.

Cart-wheels. In the District of Maine, and in the northern parts of New Hampshire and Vermont, where the White Oak does not exist, the felloes and spokes of heavy wheels are made of Sugar Maple and Grey Oak. In the Middle States they are commonly of White Oak, and in some parts of Maryland and Virginia the felloes are of Spanish Oak, and occasionally of Swamp or Willow Oak. The nave is of White Elm; but in the Middle and Western *Sections* the Sour Gum is preferred. In the maritime parts of the Southern States the nave is of Live Oak, which is superior to every other species.

Ploughs and harrows are made of White Oak. The sides of wheel-barrows are of Pine, the wheel of White Oak, and the arms of Ash. In the District of Maine, ox-yokes are made of Yellow Birch, and farther south, of Maple. In the country, common sledges are of White Oak, framed and *shod* with Hickory heart or Dogwood thoroughly seasoned.

The frame of water-mills is of White Oak when it can be procured. The cogs of the wheels are of Sugar Maple in Maine, and of seaoned Hickory in the Middle States. The frame of rice-mills is of Long-leaved Pine, with the teeth of White Oak, and the cylinder of Black Gum, whose organization renders it eminently proper for this object. In the upper part of the Carolinas the Dogwood is used for teeth; but it splits unless perfectly dry.

TRUNK-MAKING.

At Boston, trunks are made of White Pine; at New York, Philadelphia and Baltimore, of Tulip Tree or Poplar, which is more solid: they are covered with neat-skins dressed with the hair.

HOUSEHOLD STUFF AND OTHER SMALL OBJECTS MANUFACTURED AT HINGHAM NEAR BOSTON.

In the Northern States a great number of small articles, principally for domestic use, are made of wood. This branch of industry is very extensively practised at Hingham, about 15 miles from Boston. Sloops are constantly plying between that place and the capital, and with a fair wind the passage is performed in two hours. A part of these wares is exported to the Middle and Southern States, to the West Indies, and even to England.

Pails. The bottom is of White Pine, and the staves are of chosen pieces of the heart of the same tree. The hoops are of White Ash, half a line thick, and wide enough to cover three fourths of the vessel: they are attached by one tack of iron and two of wood, or are confined by cutting lateral notches in one end, and inserting it in a triangular hole made in the other: — hence the name of *lock-pails.* The handle is of White Oak. These pails are sold at two dollars a dozen.

Measures for corn, fruit, potatoes, etc. These are the bushel, corresponding to the ancient *minot* of Paris, the half-bushel, the peck, etc. The bottom is of White Pine, and the circle, which is a single piece, is of Black, Red or Grey Oak. It is reduced to the proper thickness, boiled to render it flexible, and bent upon an iron cylinder. The measures made at Hingham are always of a dull blue colour, which is produced by the gallic acid of the wood acting upon the iron vessel in which it is boiled.

Butter-boxes. These are light boxes, of which the largest are 8 or 10 inches in diameter, and less than half as much in height; four others, a little smaller, contained one in the other, are put into the first, and this forms a *nest of boxes,* which is sold for 40 cents. The top and bottom are of White Pine, and the circular piece, of White Ash.

Wafer-boxes. Great numbers of these little boxes are sold at 1 dol. 20 cents the gross. The bottom is of White Pine, and the circle of Sugar Maple.

Sieves. The rim is of White Ash, taken partly from the heart and partly from the sap.

Stopcocks. The smallest are made of Sugar Maple; the largest, of White Oak: the key is of Lignum Vitæ.

Rakes. The head and handle are of White Ash; the teeth, of Mockernut Hickory, which is extremely hard.

Scythe-handles. Of White Ash.

Pullies, etc. These articles are made at Hingham; as I have already said, they are of White Ash.

WOODEN WARE IN THE MIDDLE AND SOUTHERN STATES.

The manufacture of various utensils of wood for domestic use, such as pails, washing-tubs and churns, constitutes a separate and extensive trade at New York, and still more at Philadelphia, where these articles are furnished for exportation as well as for domestic consumption. They are made of White Cedar, with handles of Hickory and hoops of young stocks of the same species stript of their bark and split in the middle. The pails are better made and more durable than those of Pine from Hingham, and they are sold one third dearer. This ware is skilfully wrought, and, if carefully preserved, it becomes whiter and harder by use.

At New York and in the Southern States, pails are also made of Red Cedar. The staves, formed from the heart and sap, are party-coloured red and white; the hoops are of brass, and the utensil is light and glossy.

Sieves. These are of two sorts: those with the bottom of hair, and those destined for coarser substances with the bottom formed of interwoven strips of wood, usually of Black or Water Ash. The circle of both is of White Oak or Hickory. The sieves used in making gun-powder should be of Hickory, which is not shredded by friction like the Oak.

Baskets. The large baskets (*corn-baskets*) used in the harvest of maize, etc., are generally of White Oak, and sometimes of Shell-bark Hickory. Light baskets are made of the European Willow, which is preferable to any American species.

Whip-stocks. Carrier's whips are made by dividing a stem of White Oak, as far as the handle, into several parts, which are braided together and covered with leather; coach-whips are of a single piece of Hickory. Ramrods for muskets are made of the same wood.

Brooms. At New York, Philadelphia and Baltimore, common brooms are of Hickory, and in the Southern States, of White Oak. They are formed by dividing the end of a stick into fine shreds, which are reversed and bound together: to prevent their twisting and breaking, they are dipt in boiling water. The handle of hair-brooms is of Pine, and the head, of Tulip Tree. The back of coarse brushes is of Black Oak.

Spade handles. These are of Ash, as well as the frame of hand-saws. At Baltimore I have seen saws mounted with Black Walnut, which is less elastic, and consequently less proper than the Ash.

Picture-frames. Those that are to be gilded are of White Pine; and the smaller ones, which are commonly blacked, are of Sweet Gum.

Plane-stocks. Always of White or Red Beech thoroughly seasoned.

Gun-stocks. For rifles and fowling-pieces, the Red Maple or Curled Sugar Maple is selected; for muskets, the Black Walnut. The Maple, after being well polished, is rubbed with a little sulphuric acid and linseed oil.

Saddle-trees. Of Red Maple or Sugar Maple, as one or the other species happens to be more abundant. The Sugar Maple has more solidity.

Screws of book-binder's presses. Of Hickory: light screws are sometimes made of Dogwood.

Hatter's blocks. Always of Sour Gum, which, from its peculiar organisation, is not liable to split.

Corn-shovels. The best are of Butternut.

Wooden bowls. Generally of Tulip Tree; sometimes of Black Gum and Butternut, which are less easily split. The most solid are made of the excrescencies on the trunk of the Black Ash; but they are rare, as the large stocks, from which they are taken, have been consumed.

Spinning-wheels and *twisting-wheels.* The lower part of the frame is of Red-flowering Maple; the nave of the wheel and the spokes, of the same species; the felloes, of Black Oak; the block, of Ash; and the distaff-rods, of Hickory. The circle of twisting-wheels is of White Oak or White Ash.

Axe-handles. Of Hickory, and preferably of Pignut; in the District of Maine, of White Oak.

Shoe-lasts. The best are of well-seasoned Beech: at Philadelphia they are sometimes of Persimon, which is sufficiently hard; and in the more northern States, of Black or of Yellow Birch, which are less eligible because more liable to warp.

Posts and rails. The use of this description of fence subsists throughout the United States. The cultivated ground still bears a small proportion to the forests; but as the population multiplies, this proportion is every day becoming greater. The borders of the Ocean are the most extensively cleared, and the country approaches nearer to the state of Nature as the distance from the shore increases. The farms insulated in the forests are less remote in some districts than in others; but as the population is thin, a proprietor sometimes cultivates not more than one acre out of a hundred and fifty of his land: the rest forms a part of the continued forests, in which cattle of every sort live in common during three quarters or even the whole of the year. To guard against their intrusion, every cultivated spot must be enclosed.

The fences are generally of two sorts: in the Northern and near the large towns of the Middle States, where wood is less plentiful, they are formed of posts set ten or twelve feet apart, and connected by five or six rails three or four inches in diameter; farther inland, where materials are still abundant, they are made in a zig-zag direction, by laying the rails one upon another, and crossing them at the angles. As these fences are seven or eight feet high, it is easily conceived that in so extensive a country they must consume an immense quantity of wood, and that their maintenance must be very expensive in the anciently settled districts. Within a few years they have begun to be replaced by quickset hedges. The duration of the fence depends upon the species of wood of which it is made, and this is regulated by the nature of the forests in the different parts of the country. In Vermont, a great part of New Hampshire, the District of Maine, New Brunswick and Lower Canada, the Arbor Vitæ furnishes the best and most durable wood, and every proprietor esteems it an advantage to have a sufficient proportion of it upon his estate to keep up his fences. In clay lands the posts last 30 or 40 years, but not more than half as long in sandy soils: I have been told that the rails endure 45 or 50 years. The posts, which are 7 or 8 feet long, are made of trunks 6 or 8 inches in diameter split in two; in 1807 they were sold at 4 dollars a hundred in the neighbourhood of Norridgewock in the District of Maine.

When the Arbor Vitæ cannot be procured, the posts are made of Hemlock Spruce, and the rails of Black

Spruce. These species are not more than half as durable as the preceding. After the Hemlock Spruce, the Grey and Red Oaks are taken for posts which last only nine or ten years.

In Gennessee and the upper part of New York, the new settlements are enclosed with zig-zag fence made of the Sugar Maple and Basswood, which are the most common trees in the country.

In the lower part of New York, New Jersey and Pennsylvania, the posts of the best fences are made of Red Cedar and White Oak, and the rails of White Cedar. The posts last 20 or 30, and the rails 30 or 40 years. The price of the posts is 13 cents each, and that of the rails, 6 dollars a hundred. On the sea-coast of Pennsylvania, the White Cedar is used for posts, and is found equally durable. In the Western Countries, particularly between Laurel Hill and the Ohio, the enclosures are all made with zig-zag fence of White Oak, and are more lasting than any other except those of Chesnut.

In Maryland, Virginia and the upper part of the more southern States, in Ohio, Kentucky and Tennessee, the species made use of are too various to be enumerated. The best posts are of Locust, Red Mulberry, Red Cedar, Chincapin, Chesnut, Black Walnut, White Oak and Black Oak; the rails are of White, Red or Black Oak, or of Yellow Pine. If the posts were charred to the distance of six inches above the surface of the ground, and the rails deprived of their bark, a precaution that is often neglected, they would last one third longer.

In the lower part of the Carolinas and Georgia, almost all the enclosures are formed with zig-zag fence of the Long-leaved Pine. Near Augusta, posts of seasoned Cypress are proved to be very durable; next to the Cypress are those of Chesnut White Oak, which is preferred in the absence of the Locust and White Oak.

In Lower Louisiana, the Cypress is said to be exclusively used for fence.

Bark for tanning. In the United States a greater variety of bark is employed in tanning than in Europe: in France, Germany and England, scarcely any other is admitted than that of the common Oak: in America a different practice is adopted from necessity, and not from a desire of perfecting the leather.

In Europe the bark for tanning is taken from stocks less than 6 inches in diameter, and even branches less than an inch thick are stript for this purpose; but in North America, the largest trees are felled for their bark, which is taken only from the trunk and the primary limbs.

The bark of the following species is selected in Canada, Nova Scotia and the United States, viz: the Hemlock Spruce, the Yellow Birch, the Grey, Red, Scarlet, Black, White and Spanish Oaks, the Rock Chesnut Oak, the Chesnut White Oak, the Loblolly Bay, and the White Beech. The remaining Oaks, such as the Pin Oak in the

Middle States, and the Willow and Water Oaks farther south, possess the same properties, but are so thinly scattered that they are only accidentally mingled with the preceding species.

From the rareness of the Oak, the bark of the Hemlock Spruce becomes an invaluable resource to the Northern States: in the District of Maine it is sold at 3 or 4 dollars a cord of 128 cubic feet, and the tree is so abundant that it will probably for a long time supply the consumption. This bark is inferior to that of the Oaks, but it is preferred to that of the White and Red Beeches, which I have seen employed only in some parts of the Western States.

A small quantity of Yellow Birch bark is used in the District of Maine only for what is called *fair leather.*

In the lower part of Connecticut and New York, in New Jersey, Pennsylvania, Maryland, the upper part of the Carolinas, and throughout the Western States, seven tenths of the bark is furnished by the Red, Scarlet and Black Oaks. The two first are confounded in use; the last possesses a more active principle, but it imparts a yellow tinge to the leather, which is made to disappear by a subsidiary process. The remaining three tenths are taken from the Rock Chesnut and Spanish Oaks. The bark of the Rock Chesnut Oak is brought to New York from the banks of the Hudson; it is more esteemed than that of the Red and Black Oaks, and sold one fourth higher: it is taken only from stocks and limbs less than

8 inches in diameter, and is not easily procured. The Spanish Oak bark, which begins to be used immediately south of Philadelphia, is also preferred to that of the Red Oak, and is dearer in the same proportion. This superiority consists in giving to the leather a better quality, and a degree of whiteness which renders it proper for more delicate and more varied uses. This species is selected in the lower part of the Southern States; but as it cannot be procured in sufficient quantities, though the tanners are few, it is replaced by that of the Loblolly Bay. The bark of this last species makes good leather, which is, however, improved by a mixture of that of the Spanish Oak, called in those States Red Oak.

On the banks of the Ohio and in some parts of Kentucky, where the Oaks are rare, the White Beech is resorted to, though allowed to be inferior to every species of Oak. In the Middle States, the White Oak bark is sometimes seen in the *tan-yards;* it makes excellent leather, but the tree has become too precious to be felled for its bark, and the cellular integument, which alone contains the tannin is extremely thin compared to the epidermis: the contrary fact, observed in the Red, Scarlet and Pin Oaks, is probably the reason of their being so generally employed.

The bark of the American Oak is exported to England, where it is esteemed inferior to that of the Common European Oak, and sold one fourth cheaper.

Fuel. Except a few persons in the cities who use coal imported from England, wood is the common fuel throughout the United States. Coal is also burnt by a part of the inhabitants of Pittsburgh and its vicinity. It abounds in that part of Pennsylvania and in all the Western States, and sometimes appears at the surface of the ground: it is so easily extracted that it is delivered at the house of the purchaser for 4 cents a bushel weighing 60 or 80 pounds. Boats laden with it descend the Ohio and Mississippi to New Orleans, whence it is embarked for Philadelphia and New York, and sold, as I am informed, at a lower price than what is imported from England. This is an invaluable resource in a country which keeps on foot no public forests, and where the natural growth is rapidly disappearing.

The large towns are furnished with fuel by individuals who are subject to none of the regulations adopted in Europe. In our cities every wood-merchant is obliged to have a certain quantity of fuel in his yard at the entrance of winter, and effectual measures are taken to render the price independant of the variations in the seasons. In the United States the markets are supplied from day to day with wood exposed to sale as soon as it is felled; hence, when the navigation of the rivers is suddenly arrested by frost, the supply is cut off: the price once rose, on such an occasion, at New York, to 40 dollars a cord.

In Gennessee, Vermont, New Hampshire, the District of Maine, and the Provinces of New Brunswick, Nova Scotia and Lower Canada, the best fuel is the Sugar Maple, after which rank the Yellow Birch, the Canoe Birch, and the Red and White Beeches. In 1806, the price of a cord of wood at Wiscasset and Hollowel was 2 dol. 50 cents, and half as much in the small towns of the interior districts.

Boston. The fuel is distinguished into that which is brought 150 or 200 miles by sea from the Province of Maine, which is made up of Sugar Maple, Yellow Birch, White Birch and Beech, and which varies in price from 6 to 8 dollars the cord; and that which comes from the surrounding country to the distance of 15 or 20 miles, which consists of Hickory and White Oak, and is sold one fourth dearer. These two descriptions of wood furnish seven eighths of the consumption.

New York. The wood is divided into Hickory and Oak: the first comprises the four species which grow in the Atlantic States, among which the Shell-bark Hickory predominates; the second consists of the Rock Chesnut Oak, the White Oak, and a smaller proportion of the Red, Scarlet and Black Oaks. The Rock Chesnut Oak is the best after the Hickory, but it is rarely sold apart. The price of Hickory wood varies in general from 12 to 15 dollars a cord, and that of Oak, from 8 to 10 dollars. Almost all the fuel consumed at New York descends the North River.

Philadelphia. The best wood consists exclusively of

Hickory, in which the Mockernut Hickory appeared to predominate. The second quality is the Black Jack Oak from the southern extremity of New Jersey, which rarely exceeds five inches in diameter, and is covered with a thick, black, rugged bark. The third class is mixed, consisting of Oak, Ash, Beech and Sweet Gum. The fourth is bakers' wood, which is formed of the Pitch Pine, the Jersey Pine and the Yellow Pine : this is the only fuel consumed in the brick-kilns in the neighbourhood of Philadelphia. Large logs of Black Gum and Tupelo are sold separately, and are usually bought for the taverns : they retain the fire a long time in the back of the chimney. Towards the end of October 1807, the price of the best wood was 9 dollars and a half a cord; of the second quality, 7 dollars and a half; of the third, 6 dollars and a half; and of the fourth, 4 dollars. The Black Gum logs were 6 or 8 cents apiece.

Baltimore. Here, also, the Hickory is sold apart, at the price of 10 dollars a cord : the Shell-bark Hickory, which does not grow in the vicinity, is never seen in the market. The second class is the Black Jack Oak, which is brought from the distance of 18 or 20 miles, and is sold at 8 dollars a cord. The third class is composed of different species of Oak, viz : the White Oak, the Post Oak, the Spanish Oak, the Willow Oak and the Black Oak : the price is from 5 to 6 dollars. Bakers and brick-makers use Pine, which is a third cheaper.

Wilmington, N. C. The fuel of this place is inferior to that of any other town in the United States; it is distinguished, however, into two classes, the first consisting of twisted stocks of the Scrub Oak about as large as the arm, cut in the neighbouring *barrens*, and sold at 4 dollars a cord; the second, of Ash, of different species of Oak, of the Red and White Bays, the Red-flowering Maple, etc.

Charleston. The Black Jack Oak holds the first place, and is sold at 6 dollars a cord. The second class, composed of the White Oak, the Post Oak and the Chesnut White Oak, is sold at 5 dollars; the third, made up of different species, such as the Live Oak, the Hickory, the Spanish Oak, the Water Oak, the Sassafras, the Red Bay, the Big Laurel and the Sweet Gum, at 4 dollars. The Live Oak and Hickory are thrown in with the rest, as the quantity is too small to repay the trouble of selection.

Augusta, Georgia. The Chesnut White Oak is the best fuel, and sells at 4 dollars a cord. In the second class are the Spanish Oak, the Water Oak, etc., the price of which is 3 dollars.

Such are the species of wood principally consumed for fuel in the cities of the United States, and such, in 1806 and 1807, were their prices, which had doubled within 25 years.

The dearness of wood in New York and Philadelphia, situated as they are on navigable rivers flowing through extensive countries covered with woods, must appear surprising; the price nearly equals and sometimes exceeds that of the best wood in Paris, though this immense capital annually requires more than 300,000 cords, and is surrounded to the distance of 300 miles by cultivated plains. The advantages enjoyed in this respect by Paris and other cities of France and Germany, is owing to the careful preservation and skilful management of the forests.

THE END.

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ERRATA.

VOL. I.

Page 5, line 21, after *however*, insert a comma.

13, l. 12, in, *read* on.

22, l. 10, employed, *read* used.

56, l. 10, points, *read* point.

65, l. 5, instruments, *read* implements.

80, l. 7, tree forms, *read* trees form.

143, l. 18, be presented, *read* shall be presented; — l. 22, center, *read* centre.

175, l. 5, rigours, *read* rigour.

181, l. 6, dele *of the*; — l. 17, Mohawk river, *read* river Mohawk.

182, l. 3, nor, *read* not.

183, l. 24, sessil, *read* sessile.

184, l. 2, petiole, *read* peduncle.

195, l. 2, accompagny, *read* accompany; — l. 24, The, *read* They.

198, l. 19, four, *read* four or six.

214, l. 19, inclosed, *read* enclosed.

222, l. 8, woodman, *read* forester.

226, l 1, in, *read* by.

227, l. 3, making, *read* obtaining.

233, l. 25, in greatest, *read* in the greatest; — l. 26, it, *read* in.

234, l. 3, Alleghany, Mononghahela and Ohio rivers, *read* rivers Alleghany, Mononghahela and Ohio.

235, l. 20, break through their enclosures, *read* break into enclosures.

238, l. 7, exibit, *read* exhibit: *dele the note.*

251, l. 28, dele *it.*

265, l. 28, dele *there are.*

266, l. 6, pictoresque, *read* picturesque.

VOL. II.

Page 11, l. 10, whiskey, *read* whisky.

12, l. 17, atmosphere, *read* air.

18, l. 9, Nolachachuky, *read* Nolachuky.

43, l. 5 and 16, pannels, *read* panels.

44, l. 16, fellies, *read* felloes.

79, l. 3, most congenial, *read* the most congenial.

85, l. 16, 17 and 18, *read* The surface of these regions, in general very irregular and diversified in every direction with hills and vallies, is occupied, etc.

88, l. 2, soals, *read* soles.

92, l. 15, soals of shoes, *read* soles of the shoes.

94, l. 4, wood, *read* woods; — l. 16, inchantment, *read* enchantment.

95, l. 10, dele *an.*

108, l. 17, after *sofas*, dele *the.*

127, l. 9, dele *a.*

129, l. 14, this variety, *read* it.

Page 131, l. 8, hence, *read* thus.

132, l. 26, these, *read* those.

134, l. 15, thrifty, *read* thriving.

142, l. 20, dele *pods.*

144, l. 17, the Sassafras, *read* it.

146, l. 13, unfold, *read* unfold themselves.

154, l. 23, art, *read* process.

155, l. 22-23, but they do not afford it in, *read* but not in.

161, l. 9, dele *and glabrous*; — l. 21, the acidity of its leaves has procured this tree, *read* from the acidity of the leaves is derived.

166, l. 21, aside from, *read* besides.

169, l. 25, are, *read* is.

183, l. 22, its, *read* his.

190, l 6, considered degrading, *read* considered as degrading.

200, l. 9, Havanna, *read* Havannah.

202, l. 18, atchievements, *read* achievements; — l. 23, achieved, *read* done; — l. 24, which forms the admiration of, *read* which is admired by.

208, l. 1, bear the greatest analogy, *read* are the most analogous.

226, l. 2, considered unfit, *read* considered as unfit.

235, l. 4, their, *read* the.

VOL. III.

Page 5, line 5, its, *read* their.

8, l. 15, in West Tennessee and in the Southern States, *read* into West Tennessee and the Southern States.

19, l. 4 and 6, dele *have*; — l. 18, dele *a.*

22, l. 19, the handles, *r.* and the handles.

27, l. 17, being, *read* is.

37, l. 22, these, *read* trees; — l. 24, trees, *read* stocks.

43, l. 8, name, *read* names.

53, l. 4, dele *and*,

56, l. 1, collecting, *read* gathering.

57, l. 16, dele *have*

83, l. 5, in about the latitude, *read* in the latitude of about.

94, l. 13, gunwhale, *read* gunwale.

102, l. 8, dele *have.*

105, l. 1, White Lime, *read* White Lime tree.

109, l. 1, usually, *read* generally.

132, l. 5, in, *read* by.

151, l. 8, Hollowell, *read* Hallowel.

189, l. 6, lathes, *read* laths.

203, l. 21, *after* furnish, *read* articles.

250, l. 10, At, *read* In.

258, l. 23, excrescencies, *r.* excrescences.

265, l. 15, where, *read* in which.

3 2044 102 812 260

U. HOLZER, BINDER BOSTON MASS